# FRCR PART 2A

## Single Best Answer (SBA) Questions


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# Preface

In March 2009, the Royal College of Radiologists confirmed that the long anticipated change in format of the written final FRCR Part 2A examinations was to come into effect from the autumn 2009 sitting. The previous negatively marked true-false MCQs were to be replaced by 'single best answer' (SBA) questions. The SBA format comprises a 'stem' question and 5 'options' (a) – (e) to choose from, only one of which represents the best answer to the question posed in the stem. Each of the 6 modules will consist of 75 stem questions; negative marking is to be discontinued.

# Introduction

Single Best Answer questions, also known as 'One Best Answer', or 'Best of Five' questions have recently been adopted for various undergraduate and postgraduate medical examinations in multiple specialities in both the USA and the UK. They potentially offer many advantages over the previously used format of negatively marked true-false MCQs. A major criticism of the old style MCQ format relates to concerns that technique alone can get the 'exam-wise' candidate through the exam. Also, in order to avoid 'absolute' terms (always/never), the writer may use ambiguous terms such as 'commonly', 'usually', or 'frequently' which can be confusing; alternatively, in order to avoid ambiguity, the candidate may be asked to recall an isolated fact. SBA questions are designed to test the application of knowledge to help avoid such problems, and they are additionally thought to be fairer to candidates for whom English is not their first language. Candidates will require longer to complete SBA style questions due to the time taken to read and assess the stem; this has been reflected in the fact that the RCR has increased the allotted time for each examination to 2 hours, with the modules now taking place over 3, rather than 2 days.

The SBA question is composed of 3 parts: the stem, the lead in, and the options, and has 1 correct answer with 4 distracters. The ideal question has a long stem with a concise lead-in and short options. The stem typically comprises a clinical vignette and may consist of history, examination findings, pathological data or initial radiological findings. The vignette should present data which would be relevant and available to a practicing radiologist such as a clinician asking for advice on how to investigate a patient, or the details entered on a request card. Ideally, the stronger candidates would be able to answer the stem directly before even looking at the 5 options. The options should be continuous (*i.e.* all diagnoses, or all investigations), and should all grammatically follow the stem. The incorrect options should be plausible, and in some cases may not be completely wrong, but given the information stated in the stem, should be unequivocally 'less correct' than the intended answer. If couplets, or triplets are listed in the options, the correct answer should not be apparent due to its 'over representation' above other answers within the options. Additionally, the correct answer should not differ significantly in length or detail in comparison to the distracters.

We have extensively researched and cross-checked the questions, and relevant topics have been drawn from major radiology textbooks, as well as current radiological journals such as *Clinical Radiology* and *Radiographics*, and also from the 'Radiology Integrated Training Initiative' (RITI) website, an initiative of the Royal College of Radiologists. We have produced 750

'stem' questions covering all 6 modules and divided them into 2 sections. The first section consists of 50 questions per module and provides an overview; the second section consists of 75 stem questions per module and is in the format of a 'mock' examination. Readers can use this to test themselves against the clock and under examination conditions, in order to hone their technique prior to sitting the examination. Answers are given with detailed explanations and references are provided, which can also be used for further reading as appropriate.

*References and further reading: Clin Rad (2008); 63(5): 506–10, and Case SM & Swanson DB, Constructing Written Test Questions for the Basic and Clinical Sciences (2008).*

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# Abbreviation

| Abbreviation | Full |
|---|---|
| $\alpha$1AT | $\alpha$1-antitrypsin deficiency |
| $\alpha$-FP | $\alpha$-Fetoprotein |
| $\beta$-HCG | $\beta$-Human chorionic gonadotropin |
| A&E | Accident & Emergency |
| AAA | Abdominal aortic aneurysm |
| AAST | American Association for the Surgery of Trauma |
| ABC | Aneurysmal bone cyst |
| ABPA | Allergic bronchopulmonary aspergillosis |
| AC | Acromio-clavicular |
| ACTH | Adrenocorticotropic hormone |
| ADC | Apparent diffusion co-efficient |
| ADPKD | Autosomal dominant polycystic kidney disease |
| AF | Atrial fibrillation |
| AIDS | Acquired immuno-deficiency syndrome |
| AIIS | Anterior inferior iliac spine |
| ALP | Alkaline phosphatase |
| ALT | Alanine aminotransferase |
| AP | Antero-posterior |
| ARDS | Adult respiratory distress syndrome |
| ARPKD | Autosomal recessive polycystic kidney disease |
| ASD | Atrial septal defect |
| ASIS | Anterior superior iliac spine |
| AVF | Arteriovenous fistula |
| AVM | Arteriovenous malformation |
| AVN | Avascular necrosis |
| AXR | Abdominal x-ray |
| BAC | Bronchoalveolar cell carcinoma |
| BMT | Bone marrow transplant |
| BP | Blood pressure |
| BPD | Bronchopulmonary dysplasia |
| CADASIL | Cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy |
| CAF | Coronary artery fistula |
| CBD | Common bile duct |
| CBF | Cerebral blood flow |
| CBV | Cerebral blood volume |
| CC | Coraco-clavicular |

| | |
|---|---|
| CEA | Carcinoembryogenic antigen |
| CE-CT | Contrast-enhanced computed tomography |
| CF | Cystic fibrosis |
| CFA | Common femoral artery |
| CFV | Common femoral vein |
| CHD | Congenital heart disease |
| CNS | Central nervous system |
| COPD | Chronic obstructive pulmonary disease |
| CPA | Cerebello-pontine angle |
| CRL | Crown-rump length |
| CSF | Cerebro-spinal fluid |
| CT | Computed tomography |
| CTKUB | Computed tomography kidneys ureter bladder |
| CTPA | Computed tomography pulmonary angiography |
| CVA | Cerebro-vascular accident (stroke) |
| CXR | Chest x-ray |
| D+C | Dilation and curettage |
| DDH | Developmental dysplasia of the hip |
| DJJ | Duodeno-jejunal junction |
| DMSA | Dimercaptosuccinic acid |
| DNET | Dysembryoplastic neuroepithelial tumour |
| DRE | Digital rectal examination |
| DSA | Digital subtraction angiography |
| DVT | Deep vein thrombosis |
| DWI | Diffusion weighted imaging |
| EAA | Extrinsic allergic alveolitis |
| EAS | External anal sphincter |
| EBV | Epstein-Barr virus |
| ECA | External carotid artery |
| ECG | Electro-cardiogram |
| EDH | Extra-dural haematoma |
| EG | Eosinophillic granuloma |
| EIA | External iliac artery |
| ER | Estrogen receptor |
| ESM | Ejection systolic murmur |
| EUS | Endoscopic ultrasound |
| EVAR | Endovascular aneurysm repair |
| FAST | Focused assessment with sonography for trauma |
| FDG | Fluoro-deoxy-glucose |
| FEV-1 | Forced expiratory volume in 1 second |
| FIGO | Federation-International of Gynaecology and Obstetrics |
| FNA | Fine needle aspiration |
| FOV | Field of view |

| | |
|---|---|
| GCS | Glasgow coma scale |
| GCT | Giant cell tumour |
| GFR | Glomerular filtration rate |
| GI | Gastrointestinal |
| GIST | Gastrointestinal stromal tumour |
| HIDA | Hepatobiliary iminodiacetic acid |
| HIV | Human immunodeficiency virus |
| HMD | Hyaline Membrane Disease |
| HMPAO | Hexamethylpropyleneamine oxime |
| HRCT | High resolution computed tomography |
| HRT | Hormone replacement therapy |
| HSG | Hysterosalpingogram |
| HSV | Herpes Simplex virus |
| HU | Hounsfield units |
| HyCoSy | Hysterosalpingo contrast sonography |
| i.v. | Intravenous |
| IAS | Internal anal sphincter |
| ICA | Internal carotid artery |
| IIA | Internal iliac artery |
| IJV | Internal jugular vein |
| IMA | Inferior mesenteric artery |
| IMV | Inferior mesenteric vein |
| In | Indium |
| IPF | Idiopathic pulmonary fibrosis |
| IPMN | Intraductal papillary mucinous neoplasm |
| IUCD | Intrauterine contraceptive device |
| IVC | Inferior vena cava |
| IVU | Intravenous urogram |
| JCA | Juvenile chronic arthritis |
| KUB | Kidneys ureter bladder x-ray |
| LA | Left atrium |
| LAM | Lymphangioleiomyomatosis |
| LAO | Left anterior oblique |
| LC | Lymphangiitis Carcinomatosis |
| LCA | Left coronary artery |
| LCH | Langerhans cell histiocytosis |
| LIP | Lymphocytic interstitial pneumonia |
| LLL | Left lower lobe |
| LMP | Last menstrual period |
| LN | Lymph node |
| LUL | Left upper lobe |
| LV | Left ventricle |
| MALT | Mucosa-associated lymphoid tissue |

| | |
|---|---|
| MDP | Methyl diphosphonate |
| MELAS | Mitochondrial encephalopathy lactic acidosis with stroke-like episodes |
| MIBG | Meta-iodobenzylguanidine |
| MRA | Magnetic resonance angiography |
| MRCP | Magnetic resonance cholangiopancreatogram |
| MRI | Magnetic resonance imaging |
| MS | Multiple sclerosis |
| MTT | Mean transit time |
| MUGA | Multi-gated acquisition |
| NAI | Non accidental injury |
| NASH | Non alcoholic steatohepatitis |
| NEC | Necrotizing enterocolitis |
| NF | Neurofibromatosis |
| NHL | Non-Hodgkin's lymphoma |
| NICE | National institute for clinical excellence |
| NRH | Nodular regenerative hyperplasia |
| NSAID | Non-steroidal anti-inflammatory drug |
| NSIP | Non-specific interstitial pneumonia |
| OA | Osteoarthritis |
| OGD | Oesophogastroduodenoscopy |
| OI | Osteogenesis imperfecta |
| PA | Pulmonary artery |
| PAN | Polyarteritis nodosa |
| PAPVC | Partial anomalous pulmonary venous connection |
| PD | Protein density weighted |
| PE | Pulmonary embolus |
| PET | Positron emission tomography |
| PHT | Pulmonary Hypertension |
| PICC | Peripherally inserted central catheter |
| PID | Pelvic inflammatory disease |
| PIE | Pulmonary interstitial emphysema |
| PML | Progressive multifocal leukoencephalopathy |
| PPH | Primary pulmonary hypertension |
| PPV | Positive predictive value |
| PSA | Prostate specific antigen |
| PUJ | Pelvi-ureteric junction |
| PUO | Pyrexia of unknown origin |
| PV | Per vagina |
| PVL | Periventricular leukomalacia |
| PVNS | Pigmented villonodular synovitis |
| RA | Right atrium |
| RAO | Right anterior oblique |

| | |
|---|---|
| RAS | Renal artery stenosis |
| RCA | Right coronary artery |
| RCR | Royal College of Radiologists |
| RDS | Respiratory distress syndrome |
| RECIST | Response evaluation criteria in solid tumours |
| RhA | Rheumatoid arthritis |
| RHV | Right hepatic vein |
| RIF | Right iliac fossa |
| RLL | Right lower lobe |
| RML | Right middle lobe |
| RTA | Road traffic accident |
| rt-PA | Recombinant-tissue plasminogen activator |
| RUL | Right upper lobe |
| RUQ | Right upper quadrant |
| RVH | Right ventricular hypertrophy |
| SAH | Subarachnoid haemorrhage |
| SBO | Small bowel obstruction |
| SCA | Subclavian artery |
| SCC | Squamous cell carcinoma |
| SCD | Sickle cell disease |
| SDH | Sub dural haematoma |
| SFV | Superficial femoral vein |
| SLE | Systemic lupus erythematosus |
| SMA | Superior mesenteric artery |
| SMV | Superior mesenteric vein |
| SNR | Signal-to-noise ratio |
| SPECT | Single photon emission computed tomography |
| STIR | Short tau inversion recovery |
| SUFE | Slipped upper femoral epiphysis |
| SUV | Standardised uptake value |
| SVC | Superior vena cava |
| SVCO | Superior vena caval obstruction |
| $T_1W$ | $T_1$-weighted imaging |
| $T_2W$ | $T_2$-weighted imaging |
| TAPVC | Total anomalous pulmonary venous connection |
| TB | Tuberculosis |
| TCC | Transitional cell carcinoma |
| THR | Total hip replacement |
| TIPS | Transjugular intrahepatic portosystemic shunt |
| TOF | Tracheo-oesophageal fistula |
| TTN | Transient tachypnoea of the newborn |
| UAC | Umbilical artery catheter |
| UFE | Uterine fibroid embolisation |

| | |
|---|---|
| UIP | Usual interstitial pneumonia |
| US | Ultrasound |
| UTI | Urinary tract infection |
| UVC | Umbilical vein catheter |
| VACTERL | Vertebral/anal/cardiovascular/tracheal/esophageal/renal/limb anomalies |
| VAE | Venous air embolism |
| VMA | Vanillymandelic acid |
| VSD | Ventricular septal defect |
| WCC | White cell count |
| WG | Wegener's granulomatosis |

# About the authors

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## Section 1:
# Practice SBAs

# Cardiothoracic and Vascular Practice
# SBA Questions

1 **A 42 year old fit and well male has a CXR for emigration purposes. There is a rounded opacity in the right mediastinum. Subsequent CT chest reveals a 4.5 cm nodal mass with central calcification and marked enhancement following contrast administration. There are no focal lung lesions.**

**Which of the following is the most likely diagnosis?**

(a) Castleman's disease
(b) Colorectal cancer metastasis
(c) Langerhan's cell histiocystosis
(d) Non-Hodgkins lymphoma
(e) Silicosis

2 **A 54 year old woman with a 20 pack per year smoking history presents with worsening chronic dyspnoea. CXR shows prominence of the central pulmonary vasculature. Contrast enhanced CT is performed.**

**Which of the following features would not support a diagnosis of pulmonary arterial hypertension?**

(a) The patient's demographics
(b) Mosaic attenuation of the lung parenchyma
(c) Bowing of the interventricular septum convex to the right
(d) Pruning of peripheral pulmonary arteries
(e) Bronchial arteries measuring up to 4 mm in diameter

3 **A CXR is requested in a 52 year old man with chronic dyspnoea. The CXR shows bi-apical volume loss and reticulonodular changes within both upper zones.**

**Which of the following is the most likely underlying aetiology?**

(a) α1-anti-trypsin deficiency
(b) Bleomycin toxicity
(c) Silicosis
(d) Systemic sclerosis
(e) Usual interstitial pneumonitis

4 **A 25 year old woman presents with an acute seizure. CT shows a 2 cm ring enhancing lesion in the frontal lobe with surrounding oedema. CXR shows 3 opacities measuring between 1–3 cm in size, projected over the left lower zone. Contrast enhanced CT shows these lesions to be round, well defined and containing linear structures radiating away from the lesions.**

**What is the likeliest diagnosis?**
(a) Lymphangioleiomyomatosis
(b) Takayasu's arteritis
(c) Sarcoidosis
(d) Osler–Weber–Rendu syndrome
(e) Wegener's granulomatosis

5 **A 24 year old asymptomatic man has a CXR for insurance purposes. The report describes a solitary 2 cm pulmonary nodule. A subsequent CT is arranged.**

**Which of the following features favour a diagnosis of carcinoid over hamartoma?**
(a) Avid 18FDG-PET uptake
(b) Calcification
(c) Central location
(d) Hounsfield value of -30
(e) Solitary lesion

6 **A 38 year old non-smoker presents with pleuritic chest pain, shortness of breath and a raised D-Dimer. A CT pulmonary angiogram is performed which shows no pulmonary emboli. There is a solitary 3 mm, well circumscribed nodule in the right upper lobe.**

**What follow-up should you recommend?**
(a) No follow-up
(b) CT at 6–12 months
(c) CT at 3, 9, and 24 months
(d) CT 6-12 at months, then 18-24 months
(e) PET-CT or biopsy of nodule

7 **A 32 year old male patient has a routine CXR for insurance purposes. The film is well centred, the right heart border is indistinct and appears rotated. The lung parenchyma and vasculature appear normal.**

**What is the most likely cause?**

(a) Absent left pericardium
(b) Pectus excavatum
(c) Poor patient positioning
(d) Pulmonary artery enlargement
(e) Situs solitus

8 **In the staging of pleural mesothelioma, which of the following constitutes T4 disease?**

(a) Invasion of a rib
(b) Invasion of the endothoracic fascia
(c) Invasion of mediastinal fat
(d) Invasion of the soft tissue of the chest wall
(e) Non-transmural invasion of the pericardium

9 **A CXR is performed and shows a unilateral right-sided pleural effusion.**

**Which of the following extra-pulmonary conditions is most likely to produce these appearances?**

(a) Boerhaarve's syndrome
(b) Gastric neoplasm
(c) Stanford type B aortic dissection
(d) Transection of the proximal thoracic duct
(e) Traumatic aortic rupture

**10 A 46 year old man presents to an A&E department with shortness of breath. The CXR shows a diffuse opacity in the RUL. On a previous film, taken 3 months ago, he had a similar appearance in the LUL which cleared on a CXR taken 10 days later; there was a similar episode a year prior to this with an opacity in the middle lobe, which subsequently cleared.**

**Which of the following conditions is the least likely diagnosis?**

(a) Chronic eosinophilic pneumonia
(b) Churg-Strauss syndrome
(c) Extrinsic allergic alveolitis
(d) Goodpasture's syndrome
(e) Loeffler's syndrome

**11 Which of the following sequelae of intravenous contrast medium is not dose dependent?**

(a) Anaphylactoid reaction
(b) Bradycardia
(c) Nausea & vomiting
(d) Nephropathy
(e) Metallic taste

**12 A 27 year old man under investigation for suspected liver disease has his venous pressures measured and is found to have a hepatic venous wedge gradient of 3 mmHg.**

**What does this indicate?**

(a) There is no liver disease
(b) Pre-sinusoidal cause of portal venous hypertension
(c) Sinusoidal cause of portal venous hypertension
(d) Post-sinusoidal cause of portal venous hypertension
(e) There is insufficient data to draw a conclusion

**13 When optimising a CT study of the aorta, which of the following would not improve arterial enhancement?**

(a) Increasing the injection flow rate
(b) Increasing the Iodine concentration
(c) Increasing the duration of the injection
(d) Increasing the cardiac output
(e) Increasing the volume of contrast medium

**14 A 76 year old man presents with central chest pain. He is haemodynamically stable and undergoes a thoracic CT study which demonstrates a hyperdense crescent in the wall of the descending thoracic aorta on the unenhanced study, which does not change following the administration of i.v. contrast medium.**

**What is the most likely diagnosis?**
(a) Aortic dissection
(b) Atherosclerosis
(c) Intramural haematoma
(d) Vasculitis
(e) Mediastinal fibrosis

**15 A 67 year old patient with cardiac risk factors presents with left calf claudication on walking 30 yards. An MR angiogram is performed and shows a focal stenosis of the right popliteal artery. The vascular surgeons discuss further management.**

**What is the best approach for subsequent catheter angiography?**
(a) Antegrade, left common femoral artery
(b) Antegrade, right common femoral artery
(c) Retrograde, left common femoral artery
(d) Retrograde, left popliteal artery
(e) Retrograde, right common femoral artery

**16 Regarding congenital abnormality of the IVC.**

**Which of the following is most likely to be associated with azygous continuation of the IVC?**

(a) Asplenia
(b) Total anomalous pulmonary venous connection (TAPVC)
(c) Bilateral bi-lobed lungs
(d) Right isomerisation
(e) Eparterial bronchi

**17 You are asked to review a follow-up CT for a patient with a metastatic carcinoma in a clinical trial. The initial CT showed 2 pulmonary lesions, measuring 6 and 4 cm respectively. The current CT shows 3 lesions, each measuring 2 cm.**

**How should you classify the response?**

(a) Complete response
(b) Mixed response
(c) Partial response
(d) Stable disease
(e) Progressive disease

**18 Which of the following is not a feature of idiopathic pulmonary fibrosis at CT?**

(a) Ground glass opacification
(b) Tractional dilatation of the airways
(c) Honeycombing
(d) Basal predominance
(e) Subpleural distribution

**19 A 29 year old active man presents with slowly progressive intermittent unilateral claudication brought on by exercise or prolonged standing. He has never smoked and has no relevant family history. On examination, plantar flexion against resistance reproduces the symptoms.**

**What is the likely diagnosis?**

(a) Atherosclerosis
(b) Buerger's disease
(c) Cystic adventitial disease of the popliteal artery
(d) Popliteal artery entrapment syndrome
(e) Ruptured Achilles tendon

**20 With regards to the anatomy seen on a normal plain chest radiograph, which of the following is incorrect?**

(a) The anterior junctional line is formed by the apposition of the visceral and parietal pleura of the anteromedial aspect of the lungs, separated by mediastinal fat
(b) The anterior junctional line extends more cranially than the posterior junctional line
(c) The right paratracheal stripe measures up to 4 mm
(d) The left paratracheal stripe is seen less commonly than the right paratracheal stripe
(e) The left paraspinal line is seen more commonly than the right paraspinal line

**21 A 56 year old smoker without pre-existing lung disease is found to have a suspicious peripheral 2cm mass in the middle lobe.**

**Which of the following statements is false with regards to CT guided percutaneous biopsy of this mass?**

(a) The patient should be consented for a risk of pneumothorax of 40%
(b) Oxygen saturation during the procedure is mandatory
(c) If uncomplicated, biopsy could be performed as a day case
(d) The patient should be encouraged to breath hold during imaging
(e) The horizontal fissure should not be traversed if possible

**22 Regarding CTPA for the investigation of pulmonary emboli.**

**Which of the following is not a cause of a false-positive CTPA result?**

(a) Hilar lymphadenopathy
(b) Low signal-to-noise ratio
(c) Narrow windowing
(d) Respiratory artefact
(e) SVC obstruction

23 **An 18 year old man presents with a long history of recurrent pneumonias. CXR shows a 6 cm right lower lobe cystic lesion with an air/ fluid level within it. Contrast enhanced CT shows a single lesion containing fluid of water density along with higher attenuation material within it. A single aberrant vessel arising from the distal thoracic aorta is seen to enter the lesion. Angiography confirms this vessel and also demonstrates venous drainage via the pulmonary veins into the left atrium**

**What is the likeliest diagnosis?**

(a) Intralobar sequestration
(b) Extralobar sequestration
(c) Lateral thoracic meningocoele
(d) Extramedullary haematopoiesis
(e) Pulmonary abscess

24 **A 20 year old male smoker presents with a history of recurrent spontaneous pneumothoraces. CXR and subsequent CT show bilateral upper zone fine reticulonodular change with some larger discrete upper thin-walled cysts and increased lung volumes.**

**What is the likeliest diagnosis?**

(a) Sarcoidosis
(b) Non-specific interstitial pneumonitis
(c) Usual interstitial pneumonitis
(d) Langerhans cell histiocytosis
(e) Lymphangiomyomatosis

25 **Regarding the primary cardiac tumour myxoma, which of the following statements is true?**

(a) 40% occur in the right atrium
(b) Enlargement of the atrial appendage may be seen on CXR
(c) The majority are sessile
(d) Most tumours arise from the septum
(e) It typically presents in teenage years

**26** **A 66 year old man presents with right thigh claudication on walking 20 yards. He is referred for an angiogram with a view to possible angioplasty. The angiogram demonstrates a 3 cm focal stenosis of the right external iliac artery with no other significant disease seen.**

**What sized balloon would be appropriate for attempted angioplasty?**

(a) 3 mm
(b) 5 mm
(c) 7 mm
(d) 10 mm
(e) 13 mm

**27** **A 46 year old man with a dry cough is referred for a CT of the thorax. This demonstrates multiple pulmonary nodules, each less than 4 mm in diameter, in a perilymphatic and subpleural distribution.**

**What is the most likely diagnosis?**

(a) Sarcoidosis
(b) Metastases
(c) Tuberculosis
(d) Varicella pneumonia
(e) Extrinsic allergic alveolitis

**28** **Which of the following respiratory conditions is not associated with cigarette smoking?**

(a) Idiopathic pulmonary fibrosis
(b) Langerhan's cell histiocytosis
(c) Extrinsic allergic alveolitis
(d) Desquamative interstitial pneumonitis
(e) Respiratory bronchiolitis-interstitial lung disease

**29 The International Labour Office (ILO) 1980 International Classification of Radiographs pertains to which of the following conditions?**

(a) Pneumoconiosis
(b) Sarcoidosis
(c) Extrinsic allergic alveolitis
(d) Hypersensitivity pneumonitis
(e) Asbestos-related lung disease

**30 With regard to the thymus, which of the following statements is true?**

(a) 30–40% of patients with myasthenia gravis have a thymoma
(b) 10% of patients with a thymoma have myasthenia gravis
(c) Thymoma usually presents before the age of 40
(d) Cyst formation in the thymus is a feature of malignant degeneration
(e) The average age of thymoma diagnosis is less in patients with associated myasthenia gravis

**31 A 68 year old retired shipbuilder presents with shortness of breath. CXR shows a round 4 cm subpleural mass and a CT is performed.**

**Which of the following CT signs is not a feature of folded lung?**

(a) Air bronchograms
(b) Interval growth
(c) Adjacent pleural thickening
(d) Cavitation
(e) Enhancement following intravenous contrast medium

**32 With regard to emphysema, which of the following statements is not true?**

(a) It is clinically evident in 15% of smokers
(b) Panacinar emphysema has a predilection for the lower lobes
(c) The chest radiograph has a high sensitivity for diagnosing emphysema
(d) Heterogeneous involvement of the lungs improves outcome following volume reduction surgery
(e) Panacinar emphysema is associated with bronchiectasis

**33 A 55 year old man presents with chest pain radiating to the back, the arm pulses are unequal, but the patient is haemodynamically stable. CXR shows a widened mediastinum, and non-contrast CT demonstrates crescentic high attenuation material along the outer wall of the distal descending thoracic aorta.**

**Which of the following sub-classifications most accurately describes this dissection?**

(a) Stanford A and DeBakey I
(b) Stanford A and DeBakey II
(c) Stanford B and DeBakey I
(d) Stanford B and DeBakey II
(e) Stanford B and DeBakey III

**34 According to the British Thoracic Society guidelines, what distance between the lung edge and the chest wall constitutes a 'large' pneumothorax?**

(a) >1 cm
(b) >2 cm
(c) >3 cm
(d) >4 cm
(e) >5 cm

**35 A 20 year old woman undergoes a CXR as part of an occupational assessment. She is found to have an abnormal lesion in the right cardiophrenic space and subsequently undergoes CT examination which shows an anterior mass predominantly composed of fat with fine higher attenuation linear structures within it. The lesion also contains some round, well defined gas containing areas.**

**What is the likeliest diagnosis?**

(a) Liposarcoma
(b) Pericardial fat necrosis
(c) Thymolipoma
(d) Diaphragmatic hernia
(e) Teratoma

**36 A patient undergoes myocardial perfusion imaging and you are shown the standard short axis view.**

**Which part of the myocardium is uppermost as you look at it?**

(a) Anterior wall
(b) Interventricular septum
(c) Posterior wall
(d) Inferior wall
(e) Lateral wall

**37 With regard to cardiac CT imaging, which of the following statements is true?**

(a) Prospective gating enables wall motion to be evaluated
(b) Retrospective gating reduces dose in cardiac imaging
(c) The coronary arteries are best evaluated during systole
(d) Ejection fraction evaluation requires retrospective gating
(e) Pacemakers are a contraindication to cardiac CT

**38 A 40 year old woman presents haemoptysis. CXR shows multiple cavitating lesions in both lungs. Needle biopsy confirms the lesions are metastatic.**

**Which of the following is the least likely cause?**

(a) Squamous cell carcinoma of the larynx
(b) Adenocarcinoma of the cervix
(c) Transitional cell carcinoma of the bladder
(d) Adenocarcinoma of the colon
(e) Giant cell tumour of the distal femur

**39 A previously healthy 24 year old man presents following an RTA with pelvic and lower limb fractures. 3 days after admission he becomes progressively breathless and has a headache. Examination shows a petechial rash. CXR is normal; V/Q imaging demonstrates multiple peripheral subsegmental defects.**

**What is the most likely diagnosis?**

(a) Pulmonary embolism
(b) Pneumocystis infection
(c) Acute interstitial pneumonitis
(d) Fat embolism
(e) Pulmonary contusions

**40 A CT-angiogram in a 67 year old man shows a focal 1 cm popliteal occlusion with reconstitution and 3-vessel run-off. Initial sub-intimal angioplasty is successful, but acute thrombosis forms in the peroneal trunk late in the procedure. Thrombolysis with rt-PA is considered.**

**Which of the following factors would be an absolute contra-indication to thrombolysis?**

(a) CVA 3 months ago
(b) Irreversible ischaemia
(c) Major abdominal surgery 4 weeks ago
(d) Primary cerebral tumour
(e) Recent warfarin use

**41 Which of the following CT features indicates post-primary rather than primary pulmonary tuberculosis?**

(a) Miliary nodules
(b) Bronchiectasis
(c) Cavitation
(d) Tree-in-bud opacification
(e) Lymphadenopathy

**42 Following a prolonged angioplasty procedure is noted to have a swelling at the CFA puncture site. US confirms a 4 cm pseudoaneurysm. The patient is haemodynamically stable.**

**What is the most appropriate immediate treatment?**
(a) Conservative management
(b) Manual compression
(c) Stent-graft placement
(d) Surgical repair
(e) US-guided thrombin injection

**43 With respect to Mycoplasma pneumoniae infection, which of the following statements is not true?**

(a) It is the commonest non-bacterial cause of pneumonia
(b) It usually affects previously healthy individuals
(c) It usually affects the upper lobes
(d) Cavitation is not a feature
(e) Radiographic resolution may take up to 2 months

**44 A 32 year old lady, 27 weeks pregnant, is referred for a CT pulmonary angiogram.**

**Which of the following technique modifications would not be appropriate?**
(a) Reduced tube current
(b) Reduced tube voltage
(c) Reduced z-axis
(d) Reduced pitch
(e) Increased collimation thickness

**45 A previously healthy 32 year old man presents to A&E with progressive breathlessness. He has a 3-day history of a flu-like illness. Initial chest radiography demonstrates patchy bilateral consolidation. Over the next few days he develops fulminant respiratory failure. A CT performed 1 week after the onset of symptoms demonstrates areas of consolidation and ground glass opacification; in addition, tractional dilatation of the airways is evident on a CT performed at 2 weeks.**

**What is the most likely diagnosis?**

(a) Desquamative interstitial pneumonia
(b) Pneumocystis infection
(c) Lymphoid interstitial pneumonia
(d) Accelerated-phase usual interstitial pneumonia
(e) Acute interstitial pneumonia

**46 Which of the following is not a recognised indication for a transjugular intrahepatic porto-systemic shunt (TIPS) procedure?**

(a) Budd-Chiari syndrome
(b) Hepatic encephalopathy
(c) Hepato-pulmonary syndrome
(d) Refractory ascites
(e) Uncontrolled variceal bleed

**47 With regard to ventilation/perfusion (V/Q) studies, which of the following statements is not true?**

(a) Ventilation should be performed with the patient upright
(b) A low probability study is associated with a PE in around 10% of cases
(c) Perfusion images should be acquired with the patient upright
(d) A high probability study is associated with no PE in around 10% of cases
(e) Technetium agents have better imaging characteristics than Krypton for the ventilation phase

**48 The ITU team wish to discuss a chest radiograph on one of their patients.**

**Which of the following features suggest ARDS over cardiogenic pulmonary oedema?**

(a) Ratio of arterial oxygenation to inspired oxygen fraction 300 mmHg
(b) Bilateral pulmonary infiltrates
(c) Pulmonary arterial wedge pressure 20 mmHg
(d) Heart size 15 cm
(e) Bilateral pleural effusions

**49 A 53 year old man presents with abdominal pain. A post-contrast abdominal CT examination is performed in the portal phase which reveals an enlarged aorta with an eccentric thrombosed channel, extending over 8 cm.**

**Which of the following features makes a thrombosed aneurysm more likely than a chronic dissection?**

(a) Involvement of the SMA
(b) Small aortic lumen
(c) Mural calcification displaced outwards
(d) Thrombus extending over 6 cm cranio-caudally
(e) Total aortic diameter > 5 cm

**50 A 56 year old man undergoes single lung transplantation for sarcoid-related lung disease. At day 10 post-operatively he becomes increasingly dyspnoeic. The CXR shows increased consolidation within the graft lung.**

**What is the most likely cause for these appearances?**

(a) Acute rejection
(b) Aspergillus infection
(c) Cytomegalovirus infection
(d) Post-transplant lymphoproliferative disorder
(e) Recurrent sarcoidosis18

# Cardiothoracic and Vascular Practice
# SBA Answers

**1** (a)
Castleman's disease is a low-grade B-cell lymphoid proliferation of unknown aetiology. It can be localised or multicentric (multiple LNs, typically with systemic symptoms, with a poorer prognosis). The nodes may be as large as 16 cm, classically enhance avidly, and may have central calcification. Resection is curative in 90% of patients with the localised form. Metastases from vascular tumours may also produce similar findings (*e.g.* melanoma, RCC, papillary thyroid cancer). NHL can have similar features, but untreated lymphoma is not expected to produce calcified lymph nodes. The acute disseminated form of LCH can be associated with lymphadenopathy, but this is usually generalised, the patient would be expected to be systemically unwell, and these nodes do not typically calcify.

*Ref: Parker MS, et al. (2007). Clin Rad; 62(7): 707–10*

**2** (c)
There are multiple causes of pulmonary arterial hypertension which can broadly be divided into vascular, lung and cardiac causes along with idiopathic PAH. Signs include enlargement of the main PA (greater than 2.9 cm), a PA to corresponding aorta ratio of > 1 and signs of right ventricular strain which would eventually cause bowing of the interventricular system convex to the left.

*Ref: Clin Rad (2009); 64 (8): 751–60.*

**3** (c)
Causes of interstitial lung disease which predominantly affects the upper lobes include TB, silicosis, sarcoid, prior radiation therapy, ankylosing spondylitis, chronic EAA, histoplasmosis, and PCP in patients who have received aerosol pentamidine prophylaxis. The typical distribution of UIP is peripheral and basal, the other conditions predominantly affect the lower zones.

*Ref: Radiology Review Manual, 6th Ed, p. 416–7.*

**4** (d)
Also known as hereditary haemorrhagic telengiectasia, it is a group of inherited disorders that result in a number of systemic fibrovascular disorders affecting mucus membranes, skin, brain and lung. It is associated with the presence of multiple pulmonary arterio-venous fistulae. These can act as a right to left shunt and embolic sequelae in the brain can be the presenting symptom.

*Ref: Radiology Review Manual, 6th Ed, p. 521.*

**5** (c)
Pulmonary carcinoids represent < 4% of all lung tumours and approximately 15% of all carcinoid tumours within the body. They can be typical (type 1; local tumour; 90%) or atypical (type 2; metastasises to local LNs, rarely to liver), 80% are centrally located. They rarely cause carcinoid syndrome, often enhance strongly, 1/3 contain calcification, and they typically have no uptake at PET. Hamartomas are well circumscribed solitary nodules; 90% are peripheral. They are benign tumours composed of cartilage, connective tissue, muscle, fat, and bone. Fat attenuation at CT is described as pathognomonic, 'popcorn' calcification is also diagnostic but is seen in only 20%.

*Ref: Primer of Diagnostic Imaging, 4th Ed. p. 31–2.*

**6** (a)
The Fleischner society guidelines were published in 2005 and relate to the management of incidentally detected new lung nodules. They do not aply to patients < 35 yrs (as the risk of lung cancer is minimal below this age), with underlying malignancy, or with unexplained fever. Low risk patients are defined as having a minimal or absent history of smoking and of other known risk factors (*e.g.* family history, asbestos/ radon exposure). NB non or partly solid (*e.g.* ground-glass nodules) may require longer follow-up to rule out adenocarcinoma.

| Size (mm) | Low risk patients | High risk patients |
|---|---|---|
| ≤ 4 | No follow-up | Follow-up 12 months. If no change, no further imaging |
| 4–6 | Follow-up 12 months. If no change, no further imaging | Follow-up 6–12 months, then 18–24 months if no change |
| 6–8 months | Follow-up 6–12 months, then 18–24 months if no change | Follow-up at 3, 9, and 24 if no change |
| > 8 | Follow-up at 3, 9, and 24 months. Consider dynamic CT/PET/biopsy | Same as for low risk patients |

*Ref: MacMahon H, et al. (2005). Radiology; 237(2): 395–400.*

**7** (a)
Congenital absence of the pericardium may be partial (91%) or total (9%). Large defects can cause strangulation and have the appearance of the large cardiac silhouette seen in pericardial effusions, small defects are usually asymptomatic. Partial defects are more common on the left (complete left-sided absence 35%, foraminal defect left side 35%). In complete left-sided absence, the heart is shifted to the left and rotated, the PA view of the heart mimics an RAO view and the heart is separated from the sternum on the lateral view. In foraminal left-sided defects, there may only be prominence of the left atrial appendage (appears as left hilar mass, may mimic left PA enlargement). They are associated with bronchogenic cysts (30%), VSD, PDAs, CDHs and mitral stenosis.

*Ref: Primer of Diagnostic Imaging, 4th Ed, p. 150 & Radiology Review Manual, 6th Ed, p. 648–9.*

**8** (a)
The remaining scenarios constitute T3 disease.
*Ref: TNM Atlas, 5th Ed, p. 169–176.*

**9** (d)
Unilateral right-sided pleural effusions are associated with congestive cardiac failure and proximal thoracic duct transaction and, rarely pancreatitis (which can be unilateral left (68%), unilateral right (10%) or bilateral, in 22%). Unilateral left-sided pleural effusions include those mentioned and transection of the distal thoracic duct. The vast majority of traumatic aortic transections occur at the isthmus, distal to the left SCA origin, thus result in left-sided pleural effusions.

*Ref: Radiology Review Manual, 6th Ed, p. 439.*

**10** (a)
Loeffler's syndrome is also known as transient pulmonary eosinophillia. Churg-Strauss syndrome (allergic angiitis granulomatosis) classically presents with fleeting pulmonary opacities. Causes of pulmonary haemorrhage/vasculitis can also give this appearance (*e.g.* Wegener's granulomatosis or Goodpasture's syndrome). EAA can occur following exposure to the relevant trigger, which subsequently resolves on its removal. Chronic eosinophilic pneumonia typically has a peripheral distribution (the 'photographic negative' of pulmonary oedema) and appearances typically remain unchanged for weeks or months.

*Ref: Radiology Review Manual, 6th Ed, p. 483 & 493–4.*

**11** (a)
Anaphylactoid reactions mimic anaphylactic reactions but do not involve IgE and are not true hypersensitivity reactions. They may occur with as little as 1 ml of contrast medium and do not require pre-sensitisation; patients may not have the same reaction after a second exposure. The remaining features are dose-dependent reactions to intravenous contrast medium.

*Ref: R-ITI. 3_034. Common Clinical Problems: Managing Abdominal Radiological Emergencies.*

**12** (e)
These are normal physiological measurements (1–4 mmHg), but may be seen in normal patients, extrahepatic portal hypertension and some cases of pre-sinusoidal portal hypertension. Elevation in sinusoidal disease is seen and correlates with Child score and risk of oesophageal variceal haemorrhage.

*Ref: Am J Physiol. 1997; 272: 2826–32*

**13** (d)
Cardiac output is inversely proportional to arterial opacification. The other 4 techniques are used to increase arterial opacification. Rates above 8 ml/s offer no incremental value, whilst matching dose to body weight will give more uniform enhancement across a patient group.

*Ref: Radiologic Clinics of North America (2009); 47(1): 13–26*

**14** (c)
This results from the rupture of the vasa vasorum and haemorrhage in to the arterial media. It is associated with hypertension (50%, is more common in men (60%) and presents in the same manner as aortic dissection, with most (> 90%) cases non-traumatic. It has a mortality rate of around 20%.

*Ref: Radiographics (2009); 29: 791–804.*

**15** (b)
The likely location and extent of the lesion is known. As intervention is likely, the antegrade ('down the leg') approach should be adopted on the symptomatic side. A diagnostic run should be performed to confirm disease extent as MR can over-estimate it, alternatively there may have been disease progression depending on the elapsed time-interval.

**16** (c)
Azygous continuation of the IVC is congenital absence of the hepatic segment of the IVC with continuation to the right atrium occurring via the azygous or hemi-azygous veins, prevalence = 0.6%. It is often associated with polysplenia syndrome (left isomerisation) and only rarely with asplenia syndrome (right isomerisation). Polysplenia syndrome is associated with bilateral bi-lobed lungs, partial anomalous pulmonary venous connection (PAPVC), persistent left SVC, situs ambiguous, hyparterial bronchi, atrial septal defects (ASD) and double outlet right ventricle (DORV).

*Ref: Radiology Review Manual, 6th Ed, p. 626 & Primer of Diagnostic Imaging, 4th Ed, p. 140.*

**17** (e)
The development of any new lesion, or an increase in the overall size of lesions by 20% or more, indicates progressive disease. There is no 'mixed response' category in the RECIST system.

*Ref: European Journal of Cancer (2009); 45: 228–247.*

**18** (a)
Answers (b) – (e) are the classical features of IPF on CT. Ground glass opacification is not a significant feature of IPF. IPF is more common in smokers and, as such, may co-exist with emphysema which may preserve total lung volumes. Irrespective of smoking history, the incidence of bronchogenic carcinoma is increased 7x in IPF.

*Ref: R-ITI 1b_016. Idiopathic interstitial pneumonias*

**19** (d)
PAES is most common in young active male patients (60% are < 30 yrs) and must be considered in an individual of this demographic who develops calf claudication on exercise. It is bilateral in up to 67% and usually results from an anomalous course of the medial head of gastrocnemius which causes compression of the popliteal artery. It can rarely be caused by a fibrous band, or muscle hypertrophy in athletes. Surgical release of the muscle or tendon is the optimal treatment, there is no role for angioplasty/ stenting.

*Ref: Radiographics (2004); 24: 467–79.*

**20** (b)
The posterior junctional line is formed by the junction between the lungs posterior to the oesophagus and anterior to the 3rd – 5th thoracic vertebrae. It appears as a straight or mildly leftward convex line seen projected over the trachea. Unlike the anterior junctional line, it can extend above the clavicles.

*Ref: RadioGraphics (2007); 27: 33–48.*

**21** (a)
The risk of pneumothorax is 15–20%, depending on location and the presence of bullae. Only 2–5% require formal drainage. The patient should be warned that minor haemoptysis can occur. If multiple passes are required a co-axial system is usually employed. The patient is usually asked to hold their breath during inspiration in an attempt to reduce the degree of movement of the lesion between scans.

*Ref: Interventional Radiology: A Survival Guide, 2nd Ed, p. 313.*

**22** (c)
If a technically adequate study is performed CTPA is > 90% sensitive and specific for large, central PEs. False-positive results may occur if there is increased noise (hence reduced SNR), particularly in larger patients or if patients are too unwell to lift their arms above their head. Others include SVC obstruction (due to partial opacification of the vessels), hyperdynamic circulation, lymphadenopathy, and respiration/motion (due to partial voluming). Narrow windowing produces 'brighter' contrast thus filling defects may be obscured, resulting in a false *negative* result. Emboli can be detected within the proximal arteries of ≤ 5th/6th generation, sub-segmental emboli are usually undetectable (thus effectively produce a false negative result).

*Ref: Radiology Review Manual, 6th Ed, p. 524–5.*

**23** (a)
Intralobar sequestration is congenital malformation involving a lesion enclosed within the visceral pleura of the affected pulmonary lobe but has no connection with the tracheobronchial tree. It is more common than extralobar sequestration and can present in adulthood. Venous drainage of the lesion is *via* the pulmonary as opposed to the systemic veins as seen in extralobar sequestration. CT shows single or multiple cystic lesions filled with a combination of fluid, pus and mucus.

*Ref: Radiology Review Manual, 6th Ed, p. 479.*

**24** (d)
Pulmonary LCH is a rare condition affecting young male smokers, characterised by bilateral upper and mid zone changes starting with nodules (which may cavitate) and progressing through the spectrum of reticular change finishing with true fibrosis. It results in increased lung volumes in up to a third of patients.

*Ref: Radiology Review Manual, 6th Ed, p. 504.*

**25** (d)
Myxoma is the most common primary cardiac tumour in adults. 90% of patients are between 30–60 years at presentation. The majority occur in the left atrium (80%), with 75% of these arising from the interatrial septum near the fossa ovalis. They are typically villous, pedunculated tumours, with only 25% seen as a sessile mass; the average size at presentation is 6 cm. Patients present with constitutional symptoms such as fever, weight loss, or syncope. Myxomas may also produce anaemia, emboli, and obstruction of the mitral valve, which can lead to pulmonary venous hypertension and pulmonary oedema. There is enlargement of the left atrium, but not of the atrial appendage.

*Ref: Radiology Review Manual, 6th Ed, p. 646–7.*

**26** (c)
The more distal the occlusion, the smaller the balloon required for angioplasty, if the balloon is too big there is an increased risk of arterial rupture; if it's too small there is a reduced probability of success. Appropriate balloon sizes include: popliteal artery 3–4 mm, SFA or renal artery 4–6 mm, EIA 6–8 mm, and common iliac 8–10 mm.

*Ref: Primer of Diagnostic Imaging, 4th Ed. p. 671.*

**27** (a)
This is the typical distribution of pulmonary sarcoid nodules. TB, varicella pneumonia, and metastatic disease are randomly distributed. EAA nodules are typically centrilobular.

*Ref: Imaging of diseases of the chest, 3rd edn. p 637–655.*

**28** (c)
Smoking appears to have a somewhat protective effect in EAA, with the vast majority of patients being non-smokers. This may be due to peripheral airway constriction. The remaining conditions are associated with smoking, although curiously smokers with IPF appear to have better survival than non-smokers.

*Ref: Clinical Radiology (2003); 58: 259–68.*

**29** (a)
This is the system most widely used to code pneumoconioses by comparing against a standardised set of chest radiographs for nodule size, shape and extent. This semi-quantitive measure enables international epidemiological studies to be carried out.

*Ref: R-ITI. 1b_015. Pneumoconiosis.*

**30** (e)
Thymoma typically presents around 50 years of age and is associated with myasthenia gravis; the percentages values for (a) and (b) are reversed. Thymic cysts are benign and may be congenital or acquired, particularly after mediastinal radiotherapy.

*Ref: R-ITI 1b_073-Anterior mediastinal masses.*

**31** (d)
Rounded atelectasis is the end result of an exudative pleural effusion; fibrous strands cause invagination of the pleura as the fluid resolves. Hence the 'mass' has a smooth margin except where the bronchi and vessels enter - often seen pulled in to the mass and described as a 'comet-tail' or 'crow's-foot' appearance.

*Ref: Imaging of diseases of the chest, 3rd Ed, p. 97–98.*

**32** (c)
The chest radiograph has a low sensitivity, but high specificity, for diagnosing emphysema. Centrilobular and panacinar emphysema predominantly affect the upper and lower lobes respectivately, the latter being associated with bronchiectasis in 40% of cases. Centrilobular emphysema is the result of pollutants, notably smoking, whilst $\alpha$1-antitrypsin deficiency is the commonest cause of the panacinar type.

*Ref: R-ITI 1b_038. Emphysema.*

**33** (e)
Thoracic aortic dissections are classified by either the DeBakey or Stanford systems. DeBakey has 3 sub-divisions: I involves ascending and descending aorta, II ascending only, III descending only. Stanford has 2 subdivisions: A: ascending +/– descending thoracic aorta, B: descending only (NOT ascending). Thus, Stanford A incorporates DeBakey types I and II, and Stanford B is equivalent to DeBakey III.

*Ref: Radiology Review Manual, 6th Ed, p. 618–20.*

**34** (b)
Measuring the volume of a pneumothorax from the 2-D chest film is difficult, not least because the distance from the chest wall to the lung edge varies along its course. These authors estimate 2 cm to be a 50% pneumothorax, although earlier papers would estimate it at 20%.

*Ref: Thorax (2003); 58(Suppl II): ii39–ii52.*

**35** (d)
In the adult, congenital diaphragmatic hernias are typically asymptomatic. The presence of gas within bowel loops is pathognomonic. Mesenteric vessels typically appear as linear opacities. If the lesion only contains omental fat, it can be difficult to differentiate from lipoma or liposarcoma.

*Ref: RadioGraphics (2007); 27: 19–32.*

**36** (a)
The short axis view shows a circle of myocardium. The lateral wall is on your right, the septum on your left and the inferior wall at the bottom.

*Ref: R-ITI 7c_005. Basics of radionuclide image interpretation in myocardial perfusion imaging.*

**37** (d)
Prospective gating images the heart during a short period of diastole and, whilst reducing dose, only images the arteries. Evaluation of cardiac function requires imaging throughout the cardiac cycle and retrospective gating, but this has a dose penalty. Dose may be reduced by modulating mAs during systole.

*Ref: R-ITI 1a_006. Normal cardiac CT*

**38** (e)
The differential diagnosis for cavitating metastases also includes melanoma. Giant cell tumour metastases may calcify.

*Ref: Radiology Review Manual, 6th Ed, p. 515.*

**39** (d)
In fat embolism the radiographic features often progress to diffuse opacification with clearing in 7–14 days; ARDS may develop. The mottled appearance at V/Q is quite different from that seen with large pulmonary emboli. Neurological features are generalised and may progress from irritability to seizures and coma.

*Ref: Imaging of diseases of the chest, 3rd Ed, p. 976.*

**40** (d)
Absolute contra-indications include major trauma/ surgery/CPR within 2 weeks, CVA within 2 months, bleeding diathesis, pregnancy, primary or secondary cerebral malignancy and irreversible ischaemia (the acute event and normal pre-morbid imaging in this scenario makes this answer wrong in this instance). Relative contraindications include the other options given, along with cardiac emboli, age > 80 years, and a 'white' limb (surgery would be a better option in this case).

*Ref: Interventional Radiology: A Survival Guide, 2nd Ed, p. 181–2.*

**41** (a)
The difference between primary and post-primary (reactivated) TB is in the degree of previous exposure the patient has had to TB. Most features are seen in both to some degree with the exception of miliary nodules.

*Ref: R-ITI 1b_056 - Tuberculosis - basic patterns.*

**42** (e)
Femoral artery pseudoaneurysms occur in 0.2% of diagnostic and 8% of interventional procedures; compression of adjacent structures or rupture are potential complications. Risk factors include low puncture, larger catheter size, lengthy procedures, and peri-procedural anti-coagulation. Treatment can be conservative for small aneurysms < 2 cm. US-guided thrombin injection has replaced US-guided compression as the treatment of choice in uncomplicated cases due to greater success rate, reduced procedural time and better patient tolerance. Stent-grafts are more commonly used in larger diameter arteries and have a lower complication rate compared to surgery. Surgery is reserved for cases of rapid aneurysm expansion, rupture, infection, or failure of other treatments.

*Ref: Clin Rad (2008); 62(12): 1310–16.*

**43** (c)
*Mycoplasma pneumoniae* infection has a predilection for the lower lobes, although isolated upper lobe infection is well recognised. A nodular interstitial pattern may also be seen, the frequency of this finding varies significantly between series, as does the prevalence of pleural effusion.

*Ref: Imaging of diseases of the chest, 3rd edn. p 236.*

**44** (d)
If anything the pitch should be increased to reduce dose. Breast shields, abdominal shielding and increased collimation thickness should also be considered in an effort to reduce dose.

*Ref: Radiographics (2009); 29: 639–54.*

**45** (e)
The clinical history and CT appearances are characteristic of AIP, formerly known as Hamann-Rich syndrome, which pathologically resembles ARDS.

*Ref: Imaging of diseases of the chest, 3rd Ed, p. 534–5.*

**46** (b)
Refractory ascites and variceal bleeding uncontrolled by endoscopic and medical therapy account for 99% of TIPS cases. Other indications include hepatorenal syndrome, hepatopulmonary syndrome, hepatic hydrothorax and Budd-Chiari. Hepatic encephalopathy is a relative contra-indication to a TIPS procedure.

*Ref: Clin Rad (2009); 64(7): 664–74.*

**47** (e)
Krypton has better imaging characteristics with a short half-life (13 secs) and better penetration (it is a gas). Technetium is widely used for its low cost and ready availability.

*Ref: R-ITI 7I_001 Basic Pathology and Clinical Aspects.*

**48** (d)
ARDS is a response of the lung to injury which may be direct or indirect; radiological features are those of non-cardiogenic oedema which develops as a consequence but unlike simple oedema an interstitial fibrosis may develop. Mechanical ventilation is thought to contribute to this process. Pulmonary arterial wedge pressure 18 mmHg suggests raised left atrial pressures. The diagnosis of ARDS requires the ratio of arterial oxygenation to inspired oxygen to be < 200 mmHg.

*Ref: R-ITI 1b_032 ARDS-Radiology and Cause.*

**49** (c)
A thrombosed aneurysm and thrombosed blood within the false lumen of a chronic dissection can have similar appearances. In thrombosed aneurysm the calcium is typically displaced outwards, thus appears to be pushed outside from the aortic lumen (in dissection any calcium, if present would be displaced medially, 'inside' the lumen), in addition there is likely to be extensive calcification seen elsewhere in the wall. Dissection usually extends over a longer (> 6 cm) cranio-caudal distance and, although the overall aortic size is normal in the acute phase, it can be very large (> 5 cm) in the chronic phase. The aortic lumen is likely to be normal or small in dissection, but is expected to be large with an aneurysm. Involved vessels are not a reliable guide, but an aneurysm tends to involve the lumbar branches, a dissection of the renal arteries and the SMA.

*Ref: Primer of Diagnostic Imaging, 4th Ed, p. 687.*

**50.** (a)
Acute rejection typically presents within the first 4 weeks, CXR may be normal, or show oedema, worsening consolidation, peribronchial thickening, new pleural effusions, or septal lines without evidence of LVF. Infection in the first 4 weeks of transplantation is almost invariably bacterial. Acute rejection is the only other condition common within the first month and is extremely common after 1 week. CMV, PTLD and Aspergillus infection typically occur more than 4 weeks post transplantation; recurrent disease would also be expected later, but is more common in sarcoid (35%) than other conditions (< 1%).

*Ref: R-ITI 1b_059 Thoracic Imaging in Heart and Lung Transplantation.*

# Musculoskeletal and Trauma Practice
# SBA Questions

1 **A plain radiograph reveals a well-defined lucent lesion within the metaphysic and epiphysis of the distal femur. There is eccentric expansion and the cortex is thin but intact. It does not reach the articular surface. CT reveals fluid-fluid levels.**

**Which of the following is the most likely cause?**

(a) Giant cell tumour
(b) Aneurysmal bone cyst
(c) Enchondroma
(d) Non-ossifying fibroma
(e) Chondromyxoid fibroma

both have fluid-fluid level

2 **A 35 year old man suffers a knee injury during a football match and presents with pain, swelling, knee locking and an inability to fully extend his knee. He undergoes an MRI examination.**

**What is the most common site of injury?**

(a) Anterior cruciate ligament
(b) Posterior cruciate ligament
(c) Anterior horn medial meniscus
(d) Posterior horn medial meniscus
(e) Anterior horn lateral meniscus

3 **A 78 year old woman has left hip pain following a fall. On examination the left hip is shortened and externally rotated. X-rays show a fracture of the left neck of femur.**

**Which of the following fractures is at highest risk of avascular necrosis?**

(a) Basi-cervical fracture
(b) Inter-trochanteric fracture
(c) Sub-capital fracture
(d) Sub-trochanteric fracture
(e) Trans-cervical fracture

Subcapsular
subcapital
transcervical
basicervical

extracapsular
intertrochanteric
subtrochanteric

The more proximal the subcapsular #, the greater the risk of vascular compromise ⇒ ↑ risk of AVN

4 **A stress fracture in which of the following areas would be most indicative of a pseudofracture (Looser's zone) of osteomalacia?**

(a) Axillary margin of the scapula
(b) Distal 1/3 ulna
(c) Greater trochanter of the femur
(d) Lateral femoral neck
(e) Proximal 1/3 radius

5 **A CXR is performed in a patient with increasing shortness of breath. The lungs are clear, but there is a bilateral symmetrical absence of the lateral end of the clavicles.**

**Which is the least likely cause of these appearances?**

(a) Cleidocranial dysplasia
(b) Eosinophilic granuloma
(c) Hyperparathyroidism
(d) Pyknodysostosis
(e) Rheumatoid arthritis

6 **A 45 year old man has an acute episode of shortness of breath. A CXR is requested; this shows concave scalloping of the undersurface of the right 2nd and 3rd ribs, there is a slight scoliosis of the inferior aspect of the thoracic spine, but the lung parenchyma is clear.**

**Which of the following is the most likely cause of these appearances?**

(a) Marfan's syndrome
(b) Neurofibromatosis Type I
(c) Rheumatoid arthritis
(d) SLE
(e) Scleroderma

7 **Which of the following forms of micromelic dwarfism is considered to be the most severe?**

(a) Diastrophic dysplasia
(b) Heterozygous achondroplasia
(c) Nievergelt syndrome
(d) Osteogenesis Imperfecta Type 1
(e) Thanatophoric dysplasia

8 **A 12 year old boy falls and sustains a fracture to the proximal phalanx of his right index finger which extends from the articular surface to the epiphyseal plate but not extending to the metaphysis.**

**What is the Salter-Harris classification of this injury?**

(a) I epiphyseal slip
(b) II physis + metaphysis
(c) III
(d) IV physis + metaphysis + epiphysis
(e) V crush injury with vascular supply injury to physis

The prognosis gets worse as the grade increases

9 **A young man sustains blunt trauma to the chest. There is suspicion of a pneumothorax. A supine chest radiograph is available.**

**On this radiograph, which of the following would be the least supportive of this diagnosis?**

(a) Presence of the 'deep sulcus sign'
(b) A sharply outlined dome of the diaphragm
(c) A hyperlucent right upper abdominal quadrant
(d) A sharply defined anterior junctional line
(e) A poorly defined anterior cardiophrenic sulcus in supine, air accumulate in the ... ⇒ appear well defined

10 **In the evaluation of a splenic injury following trauma, which of the following features favours pseudoaneurysm over active extravasation?**

(a) Less apparent on delayed imaging
(b) Layering
(c) Ill-defined
(d) Increased size on delayed imaging
(e) Jet of contrast medium

11 **A 32 year old man presents with a painful elbow, having fallen off his bicycle. AP and lateral radiographs of the elbow are taken; an A&E doctor is unsure if an abnormality is present and phones to ask your advice.**

**Which of the following indicates an underlying abnormality?**

(a) A visible anterior fat pad
(b) On the lateral view, a line drawn through the long axis of the proximal radius passes through the capitellum
(c) The posterior fat pad is not visible
(d) 'Hourglass' or 'figure 8' sign of the distal humerus on lateral film
(e) The anterior humeral line passes through the anterior third of the capitellum.

More than one third of ~~anterior~~ capitellum should lie ant to ant humeral line, if not → a supracondylar # should be suspected

12 **A 27 year old undergoes a CXR as part of an occupational assessment. The CXR shows a solitary expansile right 5th posterior rib mass. CT confirms the mass is arising from the rib and that it shows no aggressive features.**

**What is the likeliest diagnosis?**

(a) Exostosis of the rib
(b) Benign cortical defect
(c) Langerhans cell histiocytosis
(d) Fibrous dysplasia → The commonest benign rib tumor, osteochondroma is the next common.
(e) Osteoblastoma

13 **A calcified mass is seen on a plain radiograph of a young man's femur. The mass appears to be centred within the soft tissues of the thigh and the calcification is more prominent on the periphery of the mass. There is a radiolucent zone separating the lesion from the underlying bone, the cortex of which appears unaffected.**

**Which of the following is the most likely diagnosis?**

(a) Myositis ossificans → calcified peripheral
(b) Parosteal osteosarcoma → calcified center
(c) Juxtacortical chondroma
(d) Osteochondroma
(e) Rhabdomyosarcoma

**14 A patient presents with painful swelling of the limbs and joints, particularly the knees, ankles, wrists and elbows. Digital clubbing and joint effusions are noted. Plain radiographs show marked bilateral, smooth periosteal reactions affecting the radius, ulna, tibia and fibula.**

? Hypertrophic arthropathy ≈ HPOA

**Which one of the following diseases is not associated with the most likely unifying condition?**

(a) Gaucher's disease
(b) Carcinoma of the bronchus
(c) Undifferentiated nasopharyngeal carcinoma
(d) Pleural fibroma
(e) Ulcerative colitis

**15 A lady suffers from long-standing rheumatoid arthritis. She is noted to have splenomegaly on a clinic visit. A diagnosis of Felty's syndrome is suspected clinically.**

**Which of the following is not a recognised feature of Felty's syndrome?**

Felty syndrome - ① Long standing RA ② Neutropenia ③ Splenomegaly

(a) Ulceration in the legs
(b) Neutropaenia
(c) Skin pigmentation (brown)
(d) Weight loss
(e) Low titres of rheumatoid factor × high titers

**16 A patient presents with back pain. He is found to be HLA-B27 positive and a diagnosis of ankylosing spondylitis is suspected. Plain films of the spine are requested.**

**Which of the following would be the least supportive of this diagnosis?**

(a) Calcification of the anterior longitudinal ligament
(b) Osteitis
(c) Syndesmophytes
(d) Sclerosis of the costotransverse joints
(e) Ankylosis of the costovertebral joints

Ossification of posterior rather than anterior longitudenal lig is typical of ✱AS.

**17 You are asked to review a series of plain films of the cervical spine of an adult patient.**

**Which of the following is abnormal?**

(a) On the lateral view, the distance between the anterior arch of C1 and the anterior aspect of the odontoid peg is 2 mm
(b) On the lateral view, the soft tissues anterior to C2 are 9 mm thick
(c) Harris' white ring is incomplete in its inferior aspect
(d) On the lateral view, the C4-5 interspinous distance is 30% greater than the C5-6 interspinous distance
(e) On the lateral view, the soft tissues anterior to C6 are 20 mm thick

**18 A pregnant lady suffers from sudden, spontaneous hip pain, worsened by weight bearing. The range of movement is relatively well preserved. Plain radiographs and an MR examination are performed.**

**Which of the following would be more suggestive of avascular necrosis rather than transient osteoporosis of the hip?**

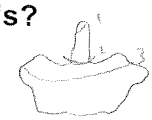
(a) Acetabular oedema on MR imaging
(b) A 'double line' sign on MR imaging
(c) Osteoporosis on plain radiographs
(d) Increased uptake in the femoral head on $^{99m}$Tc-MDP imaging
(e) Preservation of the articular cartilage on MR imaging

**19 An 8 year old child presents with a limp. Which of the following would favour a diagnosis of bacterial infection over Perthe's disease?**

(a) A smaller femoral epiphysis than on the contralateral side
(b) Joint space widening
(c) Destruction of the articular cortex
(d) Alteration of the periarticular soft tissue outline
(e) Localised bone demineralization

**20 A young man is involved in an RTA and arrives in hospital with a markedly reduced GCS. Anterior tilt of the odontoid peg is noted and an oblique fracture line is seen through the upper portion of the dens.**

**Which type of odontoid fracture is this?**



(a) Type I
(b) Type II
(c) Type III
(d) Type IV
(e) Type V

**21 Following penetrating abdominal trauma, which organ is most frequently injured?**

(a) Liver
(b) Pancreas
(c) Spleen
(d) Kidney
(e) Small bowel

**22 With regards to the Ottawa rules for plain radiographs of the foot and ankle, which of the following is incorrect?**

(a) An ankle X-ray is indicated if the patient cannot weight bear at the time of injury
(b) An ankle X-ray is indicated if there is pain in the malleolar zone and bony tenderness over the base of the 5th metatarsal
(c) A foot X-ray is indicated if there is pain in the midfoot zone and bony tenderness over the navicular
(d) An ankle X-ray is indicated if the patient cannot weight bear in the department
(e) An ankle X-ray is indicated if there is pain in the malleolar zone and bony tenderness over the posterior edge of the lateral malleolus

**23 A 7 year old boy is brought to the GP by his parents, having noticed soft, blue-coloured growths on his right hand. The hand X-ray reveals multiple enchondromas.**

**Which of the following features would confirm Mafucci's syndrome as the diagnosis rather than Ollier's disease?**

(a) A first degree relative also affected
(b) Bilateral, predominantly symmetrical disease
(c) A discrepancy in arm length
(d) Sarcomatous degeneration
(e) Soft tissue haemangiomas

**24 A 32 year old man falls on his outstretched right wrist whilst playing football. Wrist X-ray reveals a displaced, oblique intra-articular fracture of the dorsal lip of the distal radius.**

**What is the fracture type described?**

(a) Barton's
(b) Chauffeur's
(c) Colles'
(d) Smith's
(e) Salter Harris Type II

**25 A 32 year old presents with acute abdominal pain. An AXR demonstrates calcification in the LUQ, with loops of bowel in this region, central depressions in the superior and inferior endplates of L3 and L4, and a mixed lysis/sclerosis appearance to the superior aspect of the left femoral head.**

**What is the likely unifying diagnosis?**

(a) Achondroplasia
(b) Hyperparathyroidism
(c) Lymphoma
(d) Renal osteodystrophy
(e) Sickle cell disease

H-shaped vertebrae
AVN of femur
autoinfarction of spleen
hair on end appearance for the skull
osteomyelitis

**26 Which of the following statements regarding blunt thoracic trauma is not true?**

(a) Pericardial injuries are usually left sided
(b) The tricuspid valve is the most commonly injured valve
(c) Cardiac herniation through the pericardium may result in cardiac dysfunction
(d) The right ventricle is injured more frequently than the left
(e) Blunt cardiac injuries are most commonly the result of road traffic accidents

**27 Axial MR imaging of the ankle is performed. You are asked to review a single image at the level of the tibio-talar joint. You note a tendon which is swollen and contains unusually high signal, located immediately posterior to the tendon of tibialis posterior.**

**What is the likely diagnosis?**

(a) Tendonitis of extensor hallucis longus
(b) Tendonitis of extensor digitorum longus
(c) Tendonitis of flexor hallucis longus
(d) Tendonitis of flexor digitorum longus
(e) Tendonitis of tibialis anterior

**28 A 14 year old boy is referred for a CT following blunt abdominal trauma. This demonstrates a transection of the distal pancreas with free fluid in the peri-pancreatic space.**

**According to the American Association for the Surgery of Trauma (AAST), what grade is this injury?**

(a) Grade I
(b) Grade II
(c) Grade III
(d) Grade IV
(e) Grade V

**29 A man suffers a supination-abduction ankle injury. Plain films reveal an oblique fibular fracture through the tibiofibular syndesmosis.**

**Which Weber category does this represent?**

(a) A
(b) B
(c) C
(d) D
(e) E

**30 You are asked to review a hand x-ray of a 6 year old boy. The request simply states "Please assess bone age", there are no prior films available for comparison. There is osteopaenia and mild expansion of the medullary cavities of all the metacarpals and phalanges. There is additional atrophy of the trabeculae and cortical thinning.**

**What is the likely diagnosis?**

(a) Engelmann's disease
(b) Hurler's syndrome
(c) Ollier's disease
(d) Pseudo-pseudohyperparathyroidism
(e) Thalassaemia

**31 Plain radiographs are taken of a 9 year old's elbow. Five ossification centres are seen.**

**Which of the visible ossification centres would have been last to appear?**

(a) Radial head
(b) Lateral epicondyle
(c) Medial epicondyle
(d) Olecranon
(e) Trochlear

**32 Regarding idiopathic scoliosis.**

**Which of the following statements is true?**

(a) Adolescent idiopathic scoliosis is the commonest form
(b) It affects males more than females
(c) There is a worse prognosis with lumbar scoliosis
(d) Scaphocephaly is associated with infantile idiopathic scoliosis
(e) Subtle neurological abnormalities can be expected

**33 A patient has injured his knee and is unable to weight bear. AP and lateral radiographs are taken.**

**Which of the following is an abnormal finding?**

(a) On the lateral view, the distance from the lower pole of the patella to the tibial tubercle is 1.5 times the length of the patella
(b) There is irregularity of the tibial tubercle
(c) On the AP view, a perpendicular line drawn from the lateral margin of the femoral condyle has 3 mm of the lateral margin of the tibal condyle outside of it
(d) There is a corticated, calcified body in the lateral head of the gastrocnemius muscle
(e) There is a multipartite patella

**34 A patient presents with foot and ankle tenderness after a sports injury. Plain radiographs of the ankle and foot are taken.**

**Which of the following is an abnormal finding?**

(a) Bohler's angle is 31 degrees
(b) On an AP view of the midfoot, the medial margin of the second metatarsal aligns with the medial margin of the intermediate cuneiform
(c) On an AP view of the midfoot, the medial margin of the third metatarsal aligns with the medial margin of the lateral cuneiform
(d) The width of the space between the distal tibia and fibula at a point 1 cm from the articular surface is 8 mm
(e) On the AP view of the midfoot, there is a lucent line through the base of the 5th metatarsal which runs parallel to the metatarsal shaft

35 **A 50 year old man presents with knee pain. Plain radiographs show an 8 cm lytic lesion within the distal femoral metaphysis with endosteal scalloping and cortical thickening. CT shows matrix mineralisation.**

**Which of the following features does not favour a diagnosis of chondrosarcoma over enchondroma?**

(a) The patient's age
(b) The patient's sex
(c) The lesion size
(d) The lesion site
(e) The CT findings

36 **A patient has injured his right shoulder. An AP view demonstrates an acromio-clavicular distance of 12 mm and a coraco-clavicular distance of 10 mm. The clavicle is not otherwise grossly displaced.**

**What is the grade of the acromio-clavicular joint injury?**

(a) Grade I
(b) Grade II
(c) Grade III
(d) Grade IV
(e) Grade V

37 **An MRI examination of the lumbar spine demonstrates endplates with reduced signal intensity on T1W and increased signal intensity on T2W.**

**What is the most appropriate diagnosis?**

(a) Normal
(b) Type I Modic change
(c) Type II Modic change
(d) Type III Modic change
(e) Type IV Modic change

**38 A patient presents with tenderness in the anatomical snuffbox and a scaphoid series of plain radiographs are taken. There is a fracture across the proximal pole of the scaphoid.**

**Which of the following is incorrect?**

(a) Compared to other scaphoid fractures, those across the proximal pole have the highest risk of avascular necrosis
(b) Most scaphoid fractures occur across the waist
(c) Most scaphoid fractures are not displaced
(d) Scaphoid waist fractures may take up to 2 years to heal
(e) A vertical oblique fracture is considered more stable compared to a transverse fracture

**39 Regarding giant cell tumours, which of the following statements is true?**

(a) GCT usually regresses during pregnancy
(b) It is a highly malignant lesion
(c) Surgical resection is usually curative
(d) The majority arise in the spine
(e) Vertebral body involvement is more common than the posterior elements

**40 A patient presents with suspected transient patellar dislocation. MR imaging is performed.**

**Which of the following MR imaging features would be least expected in this condition?**

(a) Disruption of the medial retinaculum
(b) Lateral patellar tilt
(c) Elevation of the vastus medialis obliquus muscle
(d) Bone contusion of the medial aspect of the medial femoral condyle
(e) Bone contusion of the inferomedial aspect of the patella

**41 A patient with joint pain has plain radiographs of the hands and spine. The differential diagnosis is considered to be between psoriatic arthropathy and rheumatoid arthritis.**

**Which of the following features is more common in rheumatoid arthritis rather than psoriatic arthropathy?**

(a) Phalangeal enthesophytes
(b) Involvement of the distal interphalangeal joints
(c) Fusiform soft tissue swelling of the digits
(d) Asymmetric joint involvement
(e) Involvement of the wrist joints

**42 A patient with Paget's disease has a series of plain radiographs.**

**Which of the following is a feature of the active phase of the disease?**

(a) Widened and coarsened trabeculation of the pelvic ring
(b) 'Cotton wool' skull
(c) 'Ivory vertebra'
(d) Osteoporosis circumscripta and well-defined "flame-shaped" radiolucence within a long bone
(e) Splitting of the iliopectineal line

**43 A CT is performed following major trauma. A Hangman's fracture is suspected.**

**Which of the following features would be unusual with this diagnosis?**

(a) Avulsion of the anteroinferior corner of C2
(b) Posterior subluxation of C2 on C3
(c) Bilateral pars fracture of C2
(d) Prevertebral soft tissue swelling
(e) Disruption of the C1-C2 spinolaminar line

**44 A 38 year old woman presents with a palpable lump in her thigh. Plain films show a lobulated ossified mass lying posterior to the femur with a connection to the cortex. The centre of the lesion is denser than the periphery. MRI shows a large associated soft tissue component.**

**What is the likeliest diagnosis?**

(a) Myositis ossificans
(b) Osteochondroma
(c) Parosteal osteosarcoma
(d) Periosteal osteosarcoma
(e) Extraosseous osteosarcoma

**45 An MR arthrogram of the shoulder is performed in a patient with a known history of shoulder dislocation.**

**Which of the following features would be more supportive of prior posterior, rather than anterior, glenohumeral dislocation?**

(a) Hill-Sach's lesion
(b) Anterior labral tear
(c) Torn glenohumeral ligaments
(d) Posterior capsule stripping
(e) Bankart lesion

**46 A child presents with bruising and a tibial fracture. The possibility of non accidental injury is raised.**

**Which of the following statements with regards to NAI is incorrect?**

(a) Metaphyseal 'corner' fractures are the commonest fracture type
(b) Multiple fractures at different stages of healing is a highly specific sign
(c) Skull fractures are seen in 20% of cases
(d) Interhemispheric haemorrhage is the commonest site of intracranial haemorrhage
(e) Exuberant callus formation is a feature

**47 A 40 year old man presents with heel pain. Lateral radiograph of the foot reveals a well defined 3 cm lesion located between the anterior and middle thirds of the calcaneus. The lesion is radiolucent with a thin rim of sclerosis and central calcification.**

**What is the likely diagnosis?**

(a) Desmoplastic fibroma
(b) Giant cell tumour
(c) Intraosseous lipoma
(d) Osteoid osteoma
(e) Unicameral bone cyst

**48 Regarding osteoblastomas, which of the following is true?**

(a) An expansile appearance on plain film implies malignancy
(b) Matrix calcification is a common plain film feature
(c) They result in scoliosis more commonly than osteoid osteoma
(d) They rarely grow beyond 2 cm
(e) They usually present in the 6th–7th decades

**49 The pelvic radiograph of a young woman reveals bilateral, symmetrical triangular areas of subchrondral sclerosis on the inferior aspect of the iliac side of the joint. The joint spaces are normal and the joint margin is well-defined. There is no evidence of bone or joint disease elsewhere.**

**What is the most likely diagnosis?**

(a) Osteitis condensans ilii
(b) Infection
(c) Osteoarthritis
(d) Hyperparathyroidism
(e) Alkaptonuria

**50 A 3 month old infant presents with tender, hard swellings over a number of bones. Radiographs reveal a cortical hyperostosis and marked, diffuse, symmetrical periosteal reaction of the clavicles, ribs and mandible.**

**Which of the following is the most likely diagnosis?**

(a) Rickets
(b) Caffey's disease = infantile cortical hyperostosis
(c) Hypothyroidism
(d) Scurvy
(e) Ulcerative colitis

# Musculoskeletal and Trauma Practice
# SBA Answers

**1** (b)
Of the conditions that typically cause lucent, eccentrically expanded lesions, only GCTs and ABCs have fluid-fluid levels on CT imaging. As GCTs do not reach the articular surface, this is most likely to be an ABC.

*Ref: Aids to Radiological Differential Diagnosis, 4th Ed, p. 62.*

**2** (d)
The symptoms described are more consistent with those of a meniscal injury, rather than a ligamentous tear. Such tears are commonest in the posterior horn of the medial meniscus.

Ref: Radiology Review Manual 6th Ed, p. 117.

**3** (c)
Proximal femoral fractures are divided in subcapsular and extracapsular. The joint capsule runs from the acetabulum to the inter-trochanteric line anteriorly and to the junction of the middle/ distal third of the femoral neck posteriorly. Thus intracapsular fractures are those of the femoral neck: sub-capital, trans-cervical and basi-cervical fractures, and extracapsular include inter-trochanteric, sub-trochanteric and femoral shaft fractures. Intracapsular fractures are more susceptible to AVN because the main supply to the femoral head is from the circumflex femoral arteries, which enter *via* the capsule and are more likely to be disrupted by such fractures. Additional blood supply from the ligamentum teres artery *via* the acetabular fossa and the retinacular branches on the surface of the femoral neck, are usually insufficient to prevent AVN. Furthermore they may be compromised by the raised pressure secondary to blood within the joint capsule. The more proximal the subcapsular fracture, the greater the risk of vascular compromise, thus a sub-capital fracture has the greatest risk of AVN.

*Ref: Orthop Clin North Am (2002); 33(1): 97–111, viii.*

**4** (a)
Pseudofractures (Looser's zones) are insufficiency stress fractures with poor healing due to mineral deficiency. These are classically associated with osteomalacia, but can also be due to Paget's disease, osteogenesis imperfecta, or fibrous dysplasia. The fractures are typically bilateral and symmetrical and are at right angles to the cortical margin. Other common locations include distal 1/3 radius, proximal 1/3 ulna, lesser trochanter, medial femoral neck, ischial tuberosity, clavicle, long bones of the feet and hands.

*Ref: Radiology Review Manual, 6th Ed, p. 148.*

**5** (b)
Other causes include trauma, infection, metastases and myeloma (but these are less likely to be bilaterally symmetrical). EG is a cause of destruction of the medial end of the clavicle, which can also be caused by metastases, infection, lymphoma and rheumatoid arthritis.

*Ref: Radiology Review Manual, 6th Ed, p. 19.*

**6** (b)
The other listed diagnoses would be expected to cause superior rib notching. Superior notching is typically caused by connective tissue disorders, inferior notching is typically of vascular origin due to enlarged collateral vessels: coarctation, interrupted aortic arch, subclavian stenosis (Takayasu's), or SVC obstruction with venous collaterals, or AVMs. Hyperparathyroidism and NF-I can cause superior or inferior rib notching, the latter diagnosis is further suggested by the presence of scoliosis.

*Ref: Radiology Review Manual, 6th Ed, p. 18–9.*

**7** (e)
Thanatophoric dysplasia is the commonest type of lethal micromelic dwarfism. Features include clover-leaf skull (15%), limb bowing, narrow thorax, non-immune hydrops. Other lethal dwarfisms include camptomelic dysplasia, Ellis-van Creveld syndrome, Jeune's syndrome, achondrogenesis, hypophosphatasia, homozygous achondroplasia, OI Type 2, and chondrodysplasia punctata. Heterozygous achondroplasia, OI Types 1, 3 and 4, diastrophic dysplasia, and Nievergelt syndrome are non-lethal variants.

*Ref: Primer of Diagnostic Imaging, 4th Ed, p. 883–5.*

**8** (c)
Type I (6–8%) is an epiphyseal slip. Type II (73–75%) extends through the physis separating a metaphyseal fragment. Type IV (10–12%) involves the metaphysic, physis and epiphysis. Type III (8–10%) is described. Type V (< 1%) is a crush injury with damage to the vascular supply to the epiphysis. Common sites include the distal radius (28%), hand phalanges (26%), and distal tibia (10%). The prognosis gets worse as the grade increases, with type V injuries particularly associated with subsequent growth disturbance. Lower extremity injuries are also associated with a worse prognosis than upper limb injuries.

*Ref: Radiology Review Manual, 6th Ed, p. 84.*

**9** (e)
In the supine position, air may collect in the anterior cardiophrenic sulcus, which will therefore appear well defined against the inferior border of the heart.

*Ref: The Chest X-ray: A Survival Guide, 1st Ed, p. 96.*

**10** (a)
Pseudoaneurysms are typically well-defined, rounded and may be seen to have a neck adjoining an adjacent vessel. They are more difficult to detect on delayed images and there is no change in the haematoma. Management may be by embolisation or surgery depending on the clinical condition of the patient.

*Ref: Radiographics (2008); 28: 1603–16.*

**11** (e)
More than one third of the capitellum should lie anterior to the anterior humeral line – if not, a supracondylar fracture should be suspected. A visible posterior fat pad is always abnormal. Displacement of the anterior fat pat raises the possibility of a fracture. In a true lateral film the distal humerus appears to form an 'hourglass', loss of this or apparent asymmetry are indicators of a supracondylar fracture.

*Ref: Accident and Emergency Radiology, 2nd Ed, p. 106.*

**12** (d)
Fibrous dysplasia is the commonest benign rib tumour. Second most common is osteochondroma/bony exostosis but this typically occurs at the costochondral junction. Other benign possibilities include GCT and aneurysmal bone cyst.

*Ref: Radiology Review Manual, 6th Ed, p. 18.*

**13** (a)
Myositis ossificans is a form of heterotopic bone formation within skeletal muscle, usually resulting from blunt trauma. Although parosteal osteosarcoma can have similar appearances, myositis ossificans typically has denser calcification in the periphery; osteosarcoma shows the reverse phenomenon, with denser calcification centrally. Juxtacortical chondroma typically scallops the underlying cortex. An osteochondroma is continuous with the underlying bone.

*Ref: Musculoskeletal Imaging: the Requisites, 3rd Ed, p. 524.*

**14** (a)
The patient is most likely to be suffering from hypertrophic osteoarthropathy. This is commonly secondary to disease within the chest but many extra-thoracic causes are also recognised. Possible thoracic causes include: Bronchogenic carcinoma, lymphoma, pulmonary metastasis, a benign tumour (*e.g.* pleural fibroma), and chronic inflammation/infection (*e.g.* an abscess, bronchiectasis). Extrathoracic causes include, amongst others: inflammatory bowel disease, whipple's disease, coeliac disease, cirrhosis, dysentery and undifferentiated nasopharyngeal carcinomas.

*Ref: Aids to Radiological Differential Diagnosis, 4th Ed, p. 37.*

**15** (e)
Felty's syndrome is characterised by the combination of long-standing rheumatoid arthritis, splenomegaly and neutropaenia. Associated features include weight loss, leg ulceration, and brown skin pigmentation. Almost all have high titres of rheumatoid factor.

*Ref: Musculoskeletal Imaging: the Requisites, 3rd Ed, p. 291.*

**16** (a)
Ossification of the posterior, rather than anterior longitudinal ligament is typical of ankylosing spondylitis.

*Ref: Aids to Radiological Differential Diagnosis, 4th Ed, p. 383.*

**17** (b)
The distance between the anterior arch of C1 and the anterior aspect of the odontoid peg should be no more than 3 mm in an adult. On the lateral view, the maximum width of the prevertebral soft tissues is: 7 mm at C1-4, 22 mm at C5-7. Harris' ring is often incomplete in its inferior aspect. On the long AP view, no single interspinous distance should be more than 50% wider than the one immediately above or below it.

*Ref: Accident and Emergency Radiology, 2nd Ed, p. 87.*

**18** (b)
Transient osteoporosis of the hip is a sudden, painful but self limiting condition, first described in patients in the third trimester of pregnancy, but seen most frequently in middle-aged men. Radiographs show diffuse ostepaenia 4–8 weeks after symptom onset. MR imaging demonstrates diffuse oedema, without focal defects: oedema localised to the subchondral surface or a 'double-line' sign suggest AVN. $^{99m}$Tc-MDP imaging shows homogeneously increased uptake in the femoral head and neck.

*Ref: Can J Surg (2003); 46(3): 187–192.*

**19** (c)
Articular cortex destruction is not seen in Perthe's disease, which classically demonstrates sclerosis of the femoral head along with the findings above in the early phase. Later changes include subchondral fractures, femoral head fragmentation, femoral neck cysts and loose body formation.

*Ref: Radiology Review Manual, 6th Ed, p. 51.*

**20** (a)
Type I: a fracture through the upper portion of the dens. Type II: a transverse fracture through the junction of the dens and the body of the axis. Type III: a fracture through the body of the axis. There is no type IV nor V.

*Ref: Neuroradiology: the requisites, 2nd Ed, p. 844.*

**21** (a)
The spleen accounts for 40% of organ injuries following blunt abdominal trauma, with the liver accounting for 20%. If penetrating trauma is taken in to account as well, the liver is the most commonly injured organ.

*Ref: Radiographics (2007); 1: 109–125.*

**22** (b)
A foot x-ray is indicated with bony tenderness over the base of the 5$^{th}$ metatarsal (and midfoot pain).

*Ref: JAMA (1994); 271(11): 271–82.*

**23** (e)
Both conditions describe multiple enchondromas affecting the hands and/or feet, and both tend to be unilateral; neither has a genetic component. Both conditions can lead to shortening of the involved arm/leg, resulting in length discrepancy. Malignant degeneration can be to osteosarcoma (young adults), or chondro/fibrosarcoma (older patients); it is more common in Mafucci's syndrome, but is still seen in 5–30% of cases of Ollier's disease. Maffucci's syndrome describes enchondromas with additional multiple soft tissue haemangiomas, if bilateral there is marked asymmetry.

*Ref: Diagnostic Radiology, 5th Ed, p. 1037–8.*

**24** (a)
A Barton's fracture refers to an intra-articular fracture through the distal radius. The conventional Barton fracture involves the dorsal rim of the radius, the reverse Barton involves the volar rim. Salter-Harris fractures involve the growth plate before closure; the other types described are not intra-articular. Colles' and Smith's are fractures of the distal radius with dorsal and volar displacement of the distal fragments, respectively. A chauffeur fracture is a triangular fracture of the radial styloid process.

**25** (e)
The described findings are of an H-shaped vertebrae (often better appreciated on lateral films), left femoral head AVN, and auto-infarction of the spleen. In SCD, the Hb deforms at low oxygen tension, and obstructs small blood vessels, leading to hypoxia/ anoxia (AVN), and splenic auto-infarction (on AXR: prominent bowel loops in the LUQ +/– calcification of the spleen). Other skeletal features include 'hair-on-end' appearance to the skull, secondary osteomyelitis (often due to *Salmonella*), and premature epiphyseal fusion. Cholelithiasis, cardiomegaly, PE, cerebral infarcts, and renal papillary necrosis are also associated.

*Ref: Diagnostic Radiology, 5th Ed, p. 1773–6.*

**26** (b)
The aortic and mitral valves are more commonly affected.

*Ref: Radiographics (2009); 28: 1555–70.*

**27** (d)
The flexor tendons occur in the order (from anterior to posterior): tibialis posterior, flexor digitorum longus, flexor hallucis longus – the mnemonic 'Tom, Dick, and Harry' aids memory.

*Ref: Fundamentals of Skeletal Radiology, 3rd Ed, p. 209.*

**28** (c)
Grade I injury is a minor contusion/superficial laceration. Grade II injury is a major contusion/laceration without duct injury. Grade III injury is a distal transection/injury involving the duct. Grade IV injury is a proximal transection or injury involving the ampulla or bile duct. Grade V injury is massive disruption of the pancreatic head.

*Ref: Radiographics (2009); 28: 1591–1601.*

**29** (b)
The Weber classification is based on the location of the distal fibular fracture relative to the tibiotalar joint. Type A is a transverse fracture distal to the ankle joint; type B is an oblique fracture at the level of the joint; type C is a fibular fracture proximal to the level of the joint. There is no type D or E.

*Ref: Musculoskeletal Imaging: the Requisites, 3rd Ed, p. 253.*

**30** (e)
The earliest changes of thalassaemia can be seen in the small bones of the hand and feet. The appearances described are due to marrow hyperplasia secondary to anaemia. The changes are typically symmetrical with osteopaenia/osteoporosis, atrophy and coarsening of the trabeculae, widening of the medullary spaces, and thinning of the cortices.

*Ref: Radiology Review Manual, 6th Ed, p. 168–70.*

**31** (d)
Although there can be some variation in the order, the usual sequence of appearance is shown below:

| Approximate age at appearance (years) | Ossification centre |
|---|---|
| 1 | Capitellum |
| 3 | Radial head |
| 4–5 | Internal (medial) epicondyle |
| 7–8 | Trochlea |
| 8–10 | Olecranon |
| 9–13 | Lateral (external) epicondyle |

*Ref: Accident and Emergency Radiology, 2nd Ed, p. 100.*

**32** (a)
Scoliosis can be divided into three broad categories: congenital, idiopathic, and secondary. Idiopathic scoliosis is described as infantile (0–3 years), juvenile (4–10 years), adolescent (> 10 years), or adult onset. Adolescent idiopathic scoliosis accounts for 80% of cases, and rapid progression tends to occur during growth spurts. Prognosis is worse with a high thoracic scoliosis. Females are more commonly affected. The presence of neurological signs implies an underlying abnormality. Plagiocephaly is associated with infantile idiopathic scoliosis.

*Ref: RITI 2_018 Painful scoliosis & 5_115 Scoliosis.*

**33** (a)
On the lateral view, the distance from the lower pole of the patella to the tibial tubercle should equal the length of the patella plus or minus 20%. If this rule is broken, a ruptured patellar ligament must be suspected. On the AP view a perpendicular line drawn from the lateral margin of the femoral condyle should have ≤ 5 mm of the lateral margin of the tibal condyle outside of it. The fabella is a common sesamoid bone within the lateral head of gastrocnemius.

*Ref: Accident and Emergency Radiology, 2nd Ed, p. 214.*

**34** (d)
The width of the space between the distal tibia and fibula at a point 1 cm from the articular surface should be ≤ 6 mm. Bohler's angle is normally 30–40 degrees. In contradistinction to a fracture, the long axis of an unfused apophysis of the base of the 5th metatarsal runs parallel to the metatarsal shaft. On an AP view of the midfoot, the medial margin of the second metatarsal should align with the medial margin of the intermediate cuneiform. On an AP view of the midfoot, the medial margin of the third metatarsal aligns with the medial margin of the lateral cuneiform.

*Ref: Accident and Emergency Radiology, 2nd Ed, p. 234.*

**35** (e)
Enchondromas present in a slightly younger age group and are more common in females. They typically affect the bones of the hands and feet and are usually less than 5 cm in size. Although both lesions show matrix mineralisation, this feature is slightly commoner in enchondromas. Other features to favour chondrosarcoma over enchondroma include presentation with a mass, cortical destruction and the presence of a soft tissue mass.

*Ref: Radiology Review Manual 6th Ed, p. 59.*

**36** (b)

| Grade | Features |
|---|---|
| I | Normal radiograph |
| II | AC distance > 8–10 mm; CC distance ≤ 13 mm |
| III | AC distance > 8–10 mm; CC distance > 13 mm |
| IV | Total dislocation, clavicle dislocated into trapezius |
| V | Total dislocation, clavicle dislocated into neck |
| VI | Total dislocation, clavicle dislocated inferiorly |

*Ref: Accident and Emergency Radiology, 2nd Ed, p. 87.*

**37** (b)
Modic degenerative changes are bone marrow and endplate changes adjacent to degenerative lumbar intervertebral discs; they are commonest at the L4-L5 and L5-S1 level. Modic II is more prevalent, but Modic I changes are more likely to be symptomatic. Type I changes have MRI appearances of fluid (low T1, high T2), type II changes have the characteristics of fat due to red marrow replacement (high T1 and T2), and type III changes are due to sclerosis (low on T1 and T2).

*Ref: Radiology (2007); 245(1): 43–61.*

**38** (e)
Fractures across the proximal pole and waist both carry a high risk of subsequent AVN. 80% of fractures occur across the waist, compared to 10% for each of the poles. Transverse/horizontal oblique fractures are relatively stable compared to vertical oblique fractures.

*Ref: Musculoskeletal Imaging: the Requisites, 3rd Ed, p. 144.*

**39** (e)
GCTs are usually benign lesions. Malignancy occurs in 5–10% of cases and is usually secondary to previous radiation therapy. The majority of spinal lesions arise within the sacrum. Vertebral involvement accounts for only 7% of cases: thoracic spine is the most common location, followed by cervical and lumbar regions. They typically increase in size during pregnancy, thought to be due to hormonal influences. GCTs tend to be locally aggressive and complete surgical resection is uncommon; adjuvant radiotherapy is often administered. Recurrence occurs in 40-60%, and is suggested on plain film by the presence of new areas of osseous destruction.

*Ref: RITI 2_018 Painful scoliosis.*

**40** (d)
In transient patella dislocation, the patella dislocates laterally and then relocates. This causes impaction between the inferomedial aspect of the patella and the anterolateral aspect of the lateral femoral condyle, which results in bone contusions. In addition to the above signs, a haemarthrosis is also usually present.

*Ref: Radiology Review Manual, 6th Ed, p. 69.*

**41** (e)
The wrists are more commonly involved in rheumatoid arthritis.

*Ref: Musculoskeletal Imaging: the Requisites, 3rd Ed, p. 322.*

**42** (d)
The active phase is the osteolytic phase, also known as the 'hot' phase. Typical lesions include osteoporosis circumscripta of the skull (especially frontal and occipital bones) and well-defined, 'flame-shaped' radiolucencies of the long bones.

*Ref: Aids to Radiological Differential Diagnosis, 4th Ed, p. 590.*

**43** (b)
The Hangman's fracture is a traumatic bilateral neural arch fracture, most commonly of the pars, resulting from hyperextension. When subluxation occurs, it is more commonly an anterior, rather than posterior subluxation of C2 on C3.

*Ref: Musculoskeletal Imaging: the Requisites, 3rd Ed, p. 170.*

**44** (c)
Parosteal osteosarcomas have the best prognosis of all osteosarcomas. If no stalk can be clearly identified they can be distinguished from myositis ossificans by the relative density of the centre of the ossified part of the lesion.

*Ref: Radiology Review Manual, 6th Ed, p. 143.*

**45** (d)
Posterior dislocations produce posterior, rather than anterior, capsule stripping. Other evidence of a prior posterior dislocation include: a reverse Bankart lesion, a reverse Hill-Sach's lesions, or a posterior labral tear.

*Ref: Musculoskeletal Imaging: the Requisites, 3rd Ed, p. 99.*

**46** (a)
Metaphyseal corner fractures are relatively specific for NAI, however overall they are less common than diaphyseal fractures. Subdural haemorrhage with an interhemispheric location is the commonest type of intracranial haemorrhage.

*Ref: Radiology Review Manual, 6th Ed, p. 52.*

**47** (c)
Intraosseous lipomas are rare bone tumours; they are often asymptomatic and present incidental, but can be associated with pain. The commonest locations are within the proximal femur (Ward's triangle) and in the area of the calcaneus described. In these areas there is a relative paucity of trabecular bone and it is thought that this leads to an 'overshoot' phenomenon during the transition of haematopoietic to fatty marrow, with the resultant formation of the lipoma. Central or ring calcification in a lucent lesion in this location of the calcaneus is said to be pathognomonic of an intraosseous lipoma and allows its distinction from a UBC. If clinical doubt persists MR imaging can be used for further clarification and to confirm the presence of fat.

*Ref: Radiographics (2004); 24: 1433–1466.*

**48** (b)
Osteoblastomas are uncommon primary bone tumours (< 1%). 90% occur in 2nd – 3rd decades, although cases have been documented up to 72 years. They are histologically similar to osteoid osteoma but less well organised and by definition larger (> 2 cm). The majority (30–40%) of cases occur in the spine, with a slight predominance for the posterior elements (55%). An expansile lesion in osteoblastoma is not typically associated with malignancy. Scoliosis can occur in both and is typically painful, but occurs more commonly in osteoid osteoma, where the scoliosis results from muscle spasm secondary to the inflammatory mediators produced. Osteoblastomas are not radiosensitive and surgical excision is performed in most cases, however, recurrence is seen in up to 50%.

*Ref: RITI 2_018 Painful scoliosis.*

**49** (a)
Osteitis condensans ilii produces this radiographic appearance, typically in young multiparous women. Possible differential diagnoses include: ankylosing spondylitis, rheumatoid arthritis (both would be associated with joint space changes) and Paget's disease.

*Ref: Aids to Radiological Differential Diagnosis, 4th Ed, p. 101.*

**50** (b)
The appearances are typical of Caffey's disease, also known as infantile cortical hyperostosis. Scurvy and rickets are unlikely to produce this picture in those < 6 months old.

*Ref: Aids to Radiological Differential Diagnosis, 4th Ed, p. 38.*

# Gastro-intestinal Practice SBA Questions

1 **A 42 year old man presents with severe central abdominal pain and a raised serum amylase. 4 days later, extremely ill, the patient undergoes a CT of the abdomen which demonstrates that only the head and uncinate process of the pancreas are enhancing and there is extensive free fluid in the peri-pancreatic tissues.**

**How would you interpret these findings?**

(a) Acute pancreatitis
(b) Acute pancreatitis with necrosis
(c) Acute pancreatitis with infected necrosis
(d) Acute pancreatitis with abscess
(e) Acute pancreatitis with pseudocyst formation

2 **A patient with proven Hodgkin lymphoma is referred for a staging PET-CT. This shows a solitary focal lung lesion with cervical and mediastinal lymph node enlargement. All of these lesions are PET positive with no other sites of disease.**

**What stage is this disease?**

(a) I
(b) II
(c) IIE
(d) III
(e) IV

3 **A 47 year old patient is referred for an abdominal US. In the spleen, several rounded, thin-walled hypoechoic lesions are seen in a subcapsular position. CT shows the lesions have a density of 20 HU and there is no enhancement with intravenous contrast medium.**

**What is the most likely diagnosis?**

(a) Infarction
(b) Lymphangioma
(c) Haemangioma
(d) Hamartoma
(e) Abscess

**4** **Emphysematous gastritis is most commonly associated with which of the following organisms?**

(a) *S. pneumoniae*
(b) *C. difficile*
(c) *S. milleri*
(d) *E. coli*
(e) *S. aureus*

**5** **A 47 year old man undergoes a CT and subsequently an MRI. These show an area of focal fat accumulation adjacent to the falciform ligament anteriorly.**

**This may be attributed to flow within which of the following?**
(a) Vein of Sappey
(b) Cholecystic vein
(c) Right gastric vein
(d) Anterior gastric vein
(e) Inferior epigastric vein

**6** **A 61 year old man has alcohol-related chronic liver disease. Which of the following conditions is he not at increased risk of developing compared with the general population?**

(a) Non-specific interstitial pneumonitis
(b) Bacterial pneumonia
(c) Hydrothorax
(d) Pulmonary hypertension
(e) Acute respiratory distress syndrome

**7** **Enteropathy-associated T-cell lymphoma is most commonly associated with which of the following conditions?**

(a) Coeliac disease
(b) Crohn's disease
(c) Lymphangectasia
(d) Whipple's disease
(e) Peutz-Jegher's syndrome

8 **An 18 year old male patient with known von Hippel Lindau disease is referred for abdominal imaging.**

**Which of the following conditions would you not expect to see in association with this disease?**

(a) Phaeochromocytoma
(b) Serous cystadenoma of the pancreas
(c) Neuroendocrine pancreatic tumour
(d) Pancreatic cysts
(e) Adrenocortical carcinoma

9 **With regard to radiation enteropathy, which of the following is not true?**

(a) Acute changes occur in patients who have received 1,000cGy or more
(b) Acute changes are due to damage to the blood supply
(c) Chronic changes may be seen in up to 15% of patients
(d) Multiple stenoses are a feature of chronic disease
(e) Acute radiation enteropathy refers to changes within the first 2 months

10 **A young man presents to A&E with severe central chest pain following an episode of vomiting. On questioning he reports that he has been drinking alcohol the night before. The CT shows an eccentric hyperattenuating mass within the wall of the oesophagus.**

**What is the most likely diagnosis?**

(a) Mallory-Weiss tear
(b) Intramural oesophageal dissection
(c) Boerhaave syndrome
(d) Transmural perforation
(e) Intramural haematoma

**11 A 58 year old lady is referred for staging of a carcinoma in the middle third of the oesophagus.**

**Which of the following statements is true?**

(a) Lymphatic drainage is likely to be via the upper abdominal lymph nodes
(b) A PET study can reliably exclude the presence of involved loco-regional nodes
(c) EUS is superior to PET-CT in the evaluation of loco-regional lymph nodes
(d) Following treatment, EUS most commonly under-stages residual disease
(e) The adrenal glands are the commonest site of metastatic disease

**12 A patient with multiple medical problems is referred for CT colonography and requires intravenous hyoscine butylbromide (Buscopan) as part of the procedure.**

**Which of the medical conditions listed are contraindications to this?**

(a) Open angle glaucoma
(b) Hypertension
(c) Ischaemic heart disease
(d) Myasthenia Gravis
(e) Parkinson's disease

**13 The junction of the squamous and columnar epithelium, seen on the barium swallow, is given what term?**

(a) A-ring
(b) B-ring
(c) Schatzki ring
(d) Barrett's line
(e) Z-line

**14 A patient with a metastasis from a GIST tumour undergoes a contrast-enhanced CT study before and after chemotherapy. On the initial study, the lesion measures 5 cm in diameter and has a density of 100 HU. At follow up, the lesion measures 6 cm and has a density of 80 HU.**

**How should you classify the response to chemotherapy?**

(a) Complete response
(b) Partial response
(c) Mixed response
(d) Stable disease
(e) Progressive disease

**15 Regarding 2nd generation US contrast agents, which of the following statements is true?**

(a) Hepatocyte-specific agents are of particular value in characterising liver lesions
(b) Microbubbles persist for 30 minutes
(c) Excretion is mainly through biliary pathways
(d) A high mechanical index setting is required for dynamic imaging
(e) Metastases are best seen in the delayed phase (2-5 min)

**16 A 77 year old man presents with abdominal distension. A CT study of his abdomen and pelvis reveals nodular peritoneal thickening, omental cake and a stellate appearance within the mesentery. Some foci of calcification are evident.**

**What is the most likely diagnosis?**

(a) Tuberculosis
(b) Lymphoma
(c) Carcinoma
(d) Pseudomyxoma
(e) Mesothelioma

**17 An unenhanced CT of the liver is performed. The liver has a density of 60 HU and the spleen has a density of 50 HU.**

**How might you account for these findings?**

(a) Normal findings
(b) Diffuse fatty infiltration
(c) Haemochromatosis
(d) Wilson's disease
(e) Budd-Chiari syndrome

**18 A patient is referred for a CT of the chest, abdomen and pelvis, the clinical details read "Riedel's thyroiditis. Hyper-IgG4 disease". Are any other organs involved?'**

**Which of the following conditions are not associated?**

(a) Cryptogenic organising pneumonia
(b) Benign pleural mesothelioma
(c) Systemic sclerosis
(d) Autoimmune pancreatitis
(e) Retroperitoneal fibrosis

**19 A 50 year old man undergoes liver transplantation. A routine follow-up liver US comments that the intra-hepatic arterial Doppler has a low resistance index (0.48) and a prolonged systolic acceleration time.**

**What diagnosis does this suggest?**

(a) Hepatic artery stenosis
(b) Portal vein occlusion
(c) Hepatic artery pseudoaneurysm
(d) Graft rejection
(e) Hepatic artery thrombosis

**20 A patient with liver disease is referred for US assessment of their TIPS stent which has been in situ for 3 months. The Doppler study demonstrates a flow rate of 2.3 m/s.**

**What is this most likely to represent?**

(a) Normal flow
(b) Arterio-venous fistula
(c) Stent stenosis
(d) Stent fracture
(e) Stent occlusion

**21 Which of the following is not a recognised cause of gastric fold thickening?**

(a) Adult hypertrophic pyloric stenosis
(b) Lymphoma
(c) Gastritis
(d) Menetrier's disease
(e) Zollinger-Ellison syndrome

**22 A 45 year old woman with a history of diarrhoea and weight loss undergoes an endoscopy and has a duodenal biopsy. The biopsy is reported to show foamy macrophages. Granules within the cytoplasm of these macrophages stain positively with periodic acid-Schiff (PAS) stain.**

**What additional feature might you expect on a small bowel enema in this patient?**

(a) Multiple polyps
(b) Ulceration of the mucosa
(c) Reduced mucosal folds with dilatation of the small bowel
(d) Pseudosacculation
(e) Thickening of the mucosal folds

**23 A 2.3 cm adrenal lesion is noted in a 62 year old man undergoing a staging CT for colon carcinoma. A dedicated study demonstrates the lesion to have a density of –2 HU before contrast medium, 56 HU in the portal venous phase and 20 HU at 10 minutes.**

**What is the most likely diagnosis?**

(a) Cyst
(b) Adenoma
(c) Metastasis
(d) Lipoma
(e) Adrenocortical carcinoma

**24 Which of the following is true of polysplenia?**

(a) It has an 80% mortality in the first year
(b) It is associated with total anomalous pulmonary venous drainage
(c) It is more common in females
(d) It is associated with right isomerism
(e) It is associated with annular pancreas

**25 An 18 year old man undergoes an abdominal US and is found to have splenomegaly with multiple focal lesions.**

**Which of the following diagnoses is least likely to give these appearances?**

(a) Sarcoidosis
(b) Lymphoma
(c) Portal hypertension
(d) Sickle cell disease
(e) Amyloidosis

**26 A 40 year old man is found to have abnormal liver function whilst undergoing routine blood tests prior to abdominal surgery. Subsequent imaging demonstrates a relatively normal liver parenchyma but there is irregularity of the bile ducts with beading and short segment strictures.**

**What is the most likely diagnosis?**

(a) Autoimmune liver disease
(b) Viral hepatitis
(c) Primary biliary cirrhosis
(d) Cholangiocarcinoma
(e) Primary sclerosing cholangitis

**27 In the staging of colorectal carcinoma, inferior mesenteric lymph nodes are considered distant metastasis rather than regional drainage for which tumour site?**

(a) Ascending colon
(b) Transverse colon
(c) Descending colon
(d) Sigmoid colon
(e) Rectum

**28 A 46 year old man presents with abdominal pain, fever and vomiting 5 weeks after an episode of acute pancreatitis. A CT study shows a well-circumscribed collection adjacent to the pancreas with an enhancing rim.**

**What is the most likely diagnosis?**

(a) Pseudocyst
(b) Pancreatic abscess
(c) Infective necrosis
(d) Acute pancreatitis
(e) Chronic pancreatitis

29 **A 47 year old lady attends for an US of her biliary system. Three comet-tail artefacts are seen arising from the anterior wall, which is slightly thickened. The remainder of the examination was unremarkable.**

**What is the most likely cause?**
(a) Adenomyomatosis
(b) Cholesterolosis
(c) Gallstones
(d) Chronic cholecystitis
(e) Porcelain gallbladder

30 **A patient with a pyrexia of unknown origin is referred for a radio-labelled white cell scan with Tc-99m HMPAO.**

**At which time points should imaging of the abdomen be performed?**
(a) 1 and 3 hours
(b) 1, 3 and 6 hours
(c) 1 and 6 hours
(d) 1, 3 and 24 hours
(e) 1, 6 and 24 hours

31 **A patient is referred for the investigation of right upper quadrant pain. US has equivocal findings and a HIDA examination is requested. At 35 minutes, there is little uptake within the liver, but renal excretion is noted.**

**What is the most likely cause for these findings?**
(a) Poor liver function
(b) Acute cholecystitis
(c) Poor renal function
(d) Sphincter of Oddi dysfunction
(e) Chronic cholecystitis

**32 Where do gastrointestinal stromal tumours (GIST) most commonly arise?**

(a) Oesophagus
(b) Stomach
(c) Small intestine
(d) Colon
(e) Appendix

**33 A patient with Hodgkin's lymphoma undergoes a PET-CT which shows a 10 x 5 cm nodal mass which is PET positive. Following 2 cycles of chemotherapy, the nodal mass measures 6 x 3 cm but there is no uptake of FDG within the mass.**

**How should you report this study?**
(a) Partial response
(b) Stable disease
(c) Mixed response
(d) Too early to assess response
(e) Complete response

**34 Which of the following tumours of the vermiform appendix is encountered most commonly?**

(a) Adenocarcinoma
(b) Carcinoid
(c) Lymphoma
(d) Mucinous adenocarcinoma
(e) Gastrointestinal Stromal Tumour

**35 A 39 year old man presents with epigastric pain, diarrhoea, PR bleeding, exhaustion, and fatigue. He is noted to have a swelling of the jaw. On examination there are several calvarial lumps. CT head shows sebaceous cysts and bone lesions which are likely osteomas. OGD shows gastric hamartomas, colonoscopy shows multiple polyps throughout the colon.**

**What is the most likely diagnosis?**

(a) Cowden disease
(b) Gardner's syndrome
(c) Lynch syndrome
(d) Peutz-Jegher's syndrome
(e) Turcot's syndrome

**36 Which of the following is true of insulinomas?**

(a) Men are affected twice as often as women
(b) Multiple lesions are seen in 25% cases
(c) They account for 25% of pancreatic endocrine tumours
(d) They are associated with MEN-I syndrome
(e) Approximately 25% cases are malignant

**37 A patient is referred for an abdominal radiograph and telephones the department to ask about radiation.**

**What is the typical effective dose of a plain abdominal radiograph?**

(a) 0.02 mSv
(b) 0.3 mSv
(c) 0.7 mSv
(d) 1 mSv
(e) 1.5 mSv

**38 A patient with a 4 month history of severe upper abdominal pain undergoes an endoscopic US. This reports a combination of echogenic and echo-poor foci throughout the pancreas, an irregular contour of the pancreatic duct and thickening of the duct wall with some side duct dilatation.**

**What is the most likely diagnosis?**

(a) Autoimmune pancreatitis
(b) Pancreatic adenocarcinoma
(c) Intraductal papillary mucinous tumour
(d) von Hippel Lindau syndrome
(e) Chronic pancreatitis

**39 Hepatocellular adenomas are not associated with which of the following?**

(a) Spontaneous rupture
(b) Oral contraceptive pill
(c) Hepatocellular carcinoma
(d) Androgenic steroids
(e) Cholangiocarcinoma

**40 Which of the following is associated with an increased risk of developing pancreatic adenocarcinoma?**

(a) Hereditary pancreatitis
(b) High alcohol consumption
(c) High coffee consumption
(d) Low fibre diet
(e) Type-1 diabetes mellitus

**41 Which of the following statements regarding the internal anal sphincter is true?**

(a) It is made of striated muscle
(b) Isolated injury is usually due to obstetric injury
(c) It appears hyperechoic on endo-anal ultrasound
(d) It is the termination of the circular smooth muscle of the gastrointestinal tract
(e) The deep part fuses with the puborectalis sling and levator muscles

**42 A previously well 65 year old man has a myocardial infarction. Six days later he develops acute abdominal pain and distension; he feels nauseated and vomits. An abdominal film demonstrates distended proximal colon to the splenic flexure and normal colon distally. A contrast enema is performed with no abnormality seen.**

**What is the most likely diagnosis?**

(a) Sigmoid volvulus
(b) Adhesions causing large bowel obstruction
(c) Caecal volvulus
(d) Toxic megacolon
(e) Acute colonic pseudo-obstruction

**43 A 56 year old HIV-positive man presents with diarrhoea which the clinical team feel is due to a gastrointestinal infection. His CD4 count is 350.**

**Which of the following is most likely?**

(a) Mycobacterium tuberculosis seen when CD4 < 400
(b) Herpes simplex virus
(c) Candida albicans when CD4 < 100
(d) Cytomegalovirus
(e) Cryptosporidium

**44 How many types of caecal volvulus are described?**

(a) 1
(b) 2
(c) 3
(d) 4
(e) 5

**45 A 37 year old lady with longstanding constipation is referred for a defaecating proctography. The only abnormality seen on resulting images show an 8 cm anterior bulge of the anterior margin of the rectum with incomplete evacuation.**

**What is the diagnosis?**

(a) Rectal prolapse
(b) Rectocoele
(c) Anismus
(d) Cystocoele
(e) Enterocoele

**46 A patient with a biopsy proven cholangiocarcinoma undergoes imaging which demonstrates that the tumour is confined to the common bile duct.**

**How would you classify this?**

(a) Bismuth I
(b) Bismuth II
(c) Bismuth III
(d) Bismuth IV
(e) Bismuth V

**47 A 56 year old patient presents with carcinoid syndrome and is found to have liver metastases.**

**What is the most likely site of the primary lesion?**

(a) Stomach
(b) Duodenum
(c) Small Bowel
(d) Appendix
(e) Rectum

**48 A 28 year old man with cystic fibrosis and abnormal liver function is referred to you for liver imaging by his clinical team.**

**Which of the following are not associated with cystic fibrosis?**

(a) Nodular regenerative hyperplasia
(b) Steatosis
(c) Sclerosing cholangitis
(d) Cirrhosis
(e) Cholelithiasis

**49 A patient with known Crohn's disease is referred for a small bowel enema.**

**Which of the following features would you not expect to see?**

(a) Aphthoid ulcers
(b) Kinked bowel segments
(c) Sacculation
(d) Increased number of folds in the ileum
(e) Loop separation

**50 A 76 year old man with a clinical suspicion of a hernia is referred for an ultrasound. A colleague performs the study and reports: "The hernia lies lateral to the conjoint tendon and medial to the inferior epigastric artery at the inferior aspect of Hesselbach's triangle."**

**What type of hernia is described?**

(a) Direct inguinal hernia
(b) Spigelian hernia
(c) Hypogastic hernia
(d) Femoral hernia
(e) Obturator hernia

# Gastro-intestinal Practice SBA Answers

**1** (b)
The clinical scenario and imaging features clearly indicate acute pancreatitis. Areas of non-enhancement >3 cm, or >30% of the pancreatic volume are considered reliable CT signs for necrosis. Imaging too early in the clinical course will reduce the sensitivity of CT for evaluating pancreatic necrosis. Sepsis tends to complicate severe pancreatitis after the first 1–2 weeks, peaking at 3 weeks, and is a common cause of mortality in these patients. A discrete abscess is less common but is suggested by the development of air within a collection. Pseudocysts are common sequelae of acute pancreatitis but take at least 4 weeks to form.

*Ref: Radiology (1994); 193:297–306.*

**2** (c)
This describes stage IIE: localised involvement of a single extralymphatic organ or site and its regional lymph nodes with or without involvement of other lymph node regions on the same side of the diaphragm. Disseminated or multifocal extralymphatic disease would constitute stage IV disease.

*Ref: TNM Atlas, 5th Ed; p. 371–382.*

**3** (b)
These are the typical imaging features of these asymptomatic lesions. Infarcts are usually wedge-shaped, whilst the remaining lesions usually show some enhancement.

*Ref: Diagnostic Radiology, 5th Ed, p. 1763.*

**4** (d)
*Clostridium welchii* is another common cause of this unusual condition. *S. pneumoniae*, *S. aureus* (and *E. coli*) may cause non-emphysematous gastritis. *S. milleri* is a cause of liver abscesses and *C. difficile* colitis.

*Ref: Diagnostic Radiology, 5th Ed, p. 638.*

**5** (a)
This is a common aberrant vein which drains the superior epigastric vein and/ or the internal thoracic veins and communicates with the left portal vein branches.

*Ref: J Comput Assist Tomogr (2007); 31:526–33.*

**6** (a)
There is no increased risk of NSIP or any other interstitial lung disease as a result of cirrhosis. Patients with cirrhosis have altered immunity and undergo changes to the vascular bed both within the liver and the lungs.

*Ref: Radiographics (2009); 29:825–837.*

**7** (a)
This is invariably seen in the underlying bowel in patients with this condition, although it may not have been diagnosed prior to the lymphoma. The other conditions do not predispose to lymphomas.

*Ref: Radiol Clin North Am (2008); 46(2):287–312.*

**8** (e)
There are a number of abdominal manifestations in addition to these including renal cysts and renal cell carcinoma. Epididymal papillary cystadenoma may be seen on scrotal US in male patients.

*Ref: Radiographics (2008); 28:65–79.*

**9** (b)
Acute radiation enteropathy is due to death of the mucosal cells which are dividing rapidly. Chronic enteropathy is due to the effect on the vasculature, resulting in strictures, adhesions and fistulae.

*Ref: R-ITI 3_061 Small bowel: vascular conditions of the small bowel (including bleeding and ischaemia).*

**10** (e)
The CT features indicate an intramural haematoma. Such patients often have a history of instrumentation, vomiting or food impaction and present with sudden onset pain, dysphagia or odynophagia. Haematemesis tends to occur later in the clinical course. Mallory-Weiss tear is a longitudinal mucosal laceration at the gastro-oesophageal junction. Dissection gives a double-barrelled appearance of the lumen due to a mucosal flap. Options (c) and (d) are full-thickness injuries and demonstrate mediastinal air or fluid on CT.

*Ref: Radiographics (2008); 28:1541–1553.*

**11** (c)
The upper and middle thirds of the oesophagus usually drain superiorly. Local staging is best performed with endoscopic US. PET-CT is the most accurate modality for distant lymph nodes or metastases but the intense uptake of the primary tumour may obscure local nodes. Following treatment, it is difficult to distinguish fibrosis from active tumour at EUS; PET is more accurate in this circumstance. The most common sites of metastases are, in order, liver, lungs bones and adrenal glands.

*Ref: Radiographics (2009); 29:403–42.*

**12** (d)
In addition, Buscopan is contraindicated in patients with megacolon, untreated narrow angle glaucoma, tachycardia, hypertrophy of the prostate with urinary retention, and mechanical stenoses of the gastrointestinal tract.

**13** (e)
The A-ring is transient and muscular. The B- or Schatzki ring is a fixed mucosal/ muscular ring which may cause dysphagia or obstruction. Barrett's stricture is a complication of gastro-oesophageal reflux disease and is premalignant.

*Ref: R-ITI 3_002. The Gastro-Oeosophageal Junction, Hiatus Hernia and Reflux Disease.*

**14** (b)
Metastatic GIST tumours are treated with monoclonal antibody agents. These typically reduce the blood supply and metabolism of the tumours with little change in tumour size and as such, the RECIST criteria are of little value. The Choi criteria differ from RECIST in that to obtain a PR, one needs a 10% reduction in size or a 15% reduction in density. Progressive disease requires 10% tumour growth without a 15% reduction in lesion density, a new lesion or a new or growing nodule of enhancing tumour within an existing lesion. There is no mixed response category.

*Ref: AJR (2004); 183:1619–1628.*

**15** (e)
US contrast agents are microbubbles comprising a 'shell' containing an inert gas, which is injected *i.v.* and may persist for up to 6 hours. The agents stay within the blood pool, but for an unknown reason pool in the sinusoids during the delayed (2–5 min) phase, hence metastases are well depicted. Imaging is performed using a low mechanical index (0.1–0.2) to avoid bursting the bubbles.

*Ref: Contrast Enhanced US in Clinical Practice, p. 3–9.*

**16** (e)
These are the typical features of sarcomatous mesothelioma. Peritoneal mesothelioma represents 6–10% cases of mesothelioma, with 50% cases having had previous asbestos exposure. Radiation therapy also predisposes to this condition, which affects visceral and parietal peritoneum.

*Ref: Cancer Treat Res (2008); 143:281–97.*

**17** (a)
The normal liver has a density of 50–70 HU. Fatty infiltration will reduce this as the atomic numbers of the elements C, H and O are low. Iron and copper deposition can raise the density, as they have high atomic numbers.

**18** (c)
Hyper IgG4 is a chronic inflammatory condition that may involve a number of organs. It is characterised histologically by a lymphoplasmacytic inflammation with IgG4-positive cells and exuberant fibrosis, which leaves dense fibrosis on resolution. It may respond to corticosteroids or other immunosuppressant therapy. Sclerosing sialadenitis, retro-orbital pseudotumour, and panniculitis may also be seen.

*Ref: BMC Medicine (2006); 4:23.*

**19** (a)
The tardus et parvus waveform described here is seen distal to a stenosis. At the stenosis, a jet phenomenon may be seen with greatly increased flow.

*Ref: US of Abdominal Transplantation, p. 90–104.*

**20** (c)
This is a jet phenomenon at a narrow stenosis. Normal flow rates are 0.5-1.9m/s but may vary with respiration.

*Ref: US of Abdominal Transplantation, p. 76–89.*

**21** (a)
This has similar appearances to infantile hypertrophic pyloric stenosis but may be associated with ulceration. Differentiation from malignancy in the antrum may also be difficult.

*Ref: R-ITI 3_044. Non-neoplastic disorders of the stomach and duodenum.*

**22** (e)
These are the clinical, pathological and radiological features of Whipple's disease. This is an uncommon condition of the small bowel caused by a bacterial infection, thought to be *Tropheryma whippelli.* Antibiotic therapy needs to continue for at least a year and relapses may involve the CNS.

*Ref: Digestive diseases (1995); 13:108–118.*

**23** (b)
An adenoma is typically a low density lesion (< 15 HU) due to fat within the lesion. It usually demonstrates a rapid wash-in and wash-out of intravenous contrast medium, thus the density at 10 minutes is less than half that seen in the portal venous phase.

*Ref: Radiology (2008) 249: 756–75.*

**24** (c)
The remaining features are seen in asplenia, which is more commonly seen in males. Polysplenia has a mortality of 50–60% and is associated with partial abnormal pulmonary venous return, left isomerism and a semi-annular pancreas.

*Ref: R-ITI 3_132. The Abnormal Spleen.*

**25** (d)
Sickle cell disease results in chronic sequestration with a small, occasionally calcified, spleen. The remaining diagnoses can cause splenomegaly with or without focal lesions.

*Ref: R-ITI 3_132. The Abnormal Spleen.*

**26** (e)
Primary sclerosing cholangitis is a biliary condition of unknown aetiology that is more common in men (2:1) and often presents under the age of 45 years. It is associated with ulcerative colitis, sicca complex and retroperitoneal fibrosis and patients are at increased risk of developing cholangiocarcinoma.

*Ref: R-ITI 3_103. Gall Bladder and Biliary Tract: Inflammatory Conditions of the Biliary Tract.*

**27** (a)
The ileocolic, right colic and middle colic lymph nodes are the regional drainage for the ascending colon (following arterial blood supply). All other nodal groups are considered distant metastases.

*Ref: TNM Atlas, 5th Ed, p. 103.*

**28** (b)
A pancreatic abscess complicates 3% of cases of acute pancreatitis and is due to infection within a fluid collection such as a pseudocyst. Such abscesses may be found anywhere within the abdomen or pelvis and require percutaneous drainage.

*Ref: Radiology (1994); 193:297–306.*

**29** (a)
Adenomyomatosis is caused by mucosal hyperplasia with herniations of mucosa in to the thickened muscular layer (Rokitansky-Aschinoff sinuses). Cholesterol crystals deposited in these sinuses give rise to the hyperechoic comet-tail artefacts from the anterior wall, clearly visible against the hypoechoic bile.

*Ref: Ultrasound: The Requisites, p. 35-54.*

**30** (a)
$^{99m}$Tc-HMPAO begins to break down by 4 hours as it is not as stable as $^{111}$In; thereafter, breakdown products may be seen within the bile and intestines.

*Ref: R-ITI 7i_004. Infection 4 - Abdominal infection.*

**31** (a)
Liver uptake should be seen within 10 minutes. Thereafter, there is filling of the gallbladder and subsequent excretion to the bowel. Cholecystitis impairs uptake to the GB.

*Ref: R-ITI 7g_005. The investigation of hepatobiliary disease-1.*

**32** (b)
Approximately 60% arise in the stomach, 30% in the small bowel, 7% in the ano-rectal region and the remainder in the oesophagus and colon.

*Ref: R-ITI 3_059. Gastro-intestinal stromal tumours (hollow organ and mesentery).*

**33** (e)
If a PET positive lesion becomes PET negative, this is regarded as a CR irrespective of the size of the nodal mass. Early assessment (after 1 or 2 cycles of chemotherapy) appears to be a better predictor of long term outcome than later imaging.

*Ref: Clin Rad (2008); 63:125–135.*

**34** (b)
Seen in up to 1.4% of histology specimens and is usually incidental. Other tumours are encountered less commonly. The presence of adenocarcinoma may necessitate a formal right hemicolectomy to resect the draining lymph nodes.

*Ref: Clin Rad (2009); 64:190–99.*

**35** (b)
5% of colorectal carcinoma is genetic in origin; the most common inherited syndromes being familial adenomatous polyposis and hereditary non-polyposis colorectal cancer (Lynch syndrome; HNPCC). Gardner's syndrome is associated with polyposis in the colon (100%), duodenum (90%) and, rarely other bowel segments; there is an association with gastric hamartomas, osteomas in calvarium/ mandible, and soft tissue tumours (30%). Turcot syndrome is a rare condition which is also associated with CNS gliomas and medulloblastomas. Peutz-Jeghers syndrome consists of hamartomas throughout the GI system with the rare potential for malignant transformation, and perioral pigmentation. Cowden disease has hamartomas, gingival hyperplasia, oral papillomas, muco-cutaneous pigmentation and an increased risk of breast and thyroid malignancy.

*Ref: Primer of Diagnostic Imaging, 4th Ed, p. 191–2.*

**36** (d)
Endocrine tumours account for 1-2% of all pancreatic tumours and insulinoma is the most common of these, representing 60% of cases. Approximately 5-10% are malignant; these tend to be the larger lesions (>5 cm). However, most lesions are less than 1.5 cm at presentation and only 5-10% cases have multiple lesions.

*Ref: European Radiology (2000); 10(Supp 2):S203–4.*

**37** (c)
A chest radiograph has an effective dose of approximately 0.02mSv or 3 days background radiation. An abdominal film has a dose 35x that at 0.7mSv, equivalent to 4 months background radiation.

*Ref: RCR. Making the best use of clinical radiology services, 6th Ed.*

**38** (e)
These are the typical findings of chronic pancreatitis at endoscopic ultrasound.

*Ref: R-ITI 3_125. Pancreas: Pancreatitis Diagnosis (Chronic).*

**39** (e)
Hepatocellular adenomas are uncommon benign tumours which comprise hepatocytes with no portal tracts or bile ducts. They are associated with the oral contraceptive pill and androgenic steroids. On imaging, they may have a scar or a pseudocapsule and enhance avidly in the arterial phase which can make differentiation from FNH difficult. There is a tendency to bleed or rupture, whilst 1% are thought to transform in to malignant lesions (HCC).

*Ref: Diagnostic Radiology, 5th Ed, p. 741–2.*

**40** (a)
There is a 70-fold increase in pancreatic adenocarcinoma in this condition. Dietary factors play no role, but cigarette smoking is associated. Diabetes mellitus may be a presenting feature, but is not associated with an increased risk of malignancy.

*Ref: R-ITI 3_127. Pancreatic adenocarcinoma.*

**41** (d)
The IAS comprises smooth muscle and is not under voluntary control. It appears hypoechoic on US. Obstetric injuries involve the external anal sphincter +/- IAS. Isolated injury is due to endo-anal trauma *e.g.* haemorrhoid surgery. Answers (a) and (e) pertain to the external anal sphincter, which is under voluntary control.

*Ref: R-ITI 3_071. Endoanal Ultrasound and Anal/Rectal MRI (Non-Malignant) Fistula Disease.*

**42** (e)
Acute colonic pseudo-obstruction (Ogilvie syndrome) is a rare condition that may be seen most commonly after trauma (including surgery), infection or with cardiac disease. The features mimic bowel obstruction and complications include perforation. Gastrografin enema may be therapeutic; air should never be insufflated in to the colon in these cases.

*Ref: Ogilvie syndrome: e-medicine Gastroenterology.*

**43** (a)
Extrapulmonary TB is seen as the CD4 count falls below 400. Candida and Cryptosporidium are associated with a CD4 <200; HSV and CMV are associated with a CD4 <100.

*Ref: Radiographics (1995); 15:1155–1178.*

**44** (c)
In the axial torsion type, the caecum twists around its long axis and remains in the right lower quadrant. In the loop type, the caecum twists around its long axis and also inverts. In the caecal bascule type, the caecum folds anteromedial to the ascending colon with no torsion. In the latter two scenarios, the caecum is found in the upper abdomen.

*Ref: AJR (2001); 177:95–8.*

**45** (b)
An anterior bulge of up to 3 or 4 cm may be normal in many cases, but beyond this, and with incomplete evacuation, the diagnosis of a rectocoele may be made. Cystocoele and enterocoele are the abnormal descent of bladder and small bowel respectively. Prolapse is the abnormal descent of the rectum. Anismus is a functional abnormality leading to poor co-ordination of the pelvic floor muscles.

*Ref: R-ITI 3_072. Constipation and Obstructive Defaecation Disorders.*

**46** (a)
A type II stricture extends in to the 1st order ducts. A type III stricture involves 2nd order ducts in either the right (IIIA) or left (IIIB) side, whilst type IV involve 2nd order ducts bilaterally. There is no type V. This classification is used to plan surgery.

*Ref: Ann Surg (2002); 215:31–38.*

**47** (c)
Over 40% of carcinoid tumours arise within the small intestine, with rectum (27%), appendix (24%) and stomach (8%) next most common. Duodenal carcinoids are rare. Small intestinal carcinoid tumours are often symptomatic.

*Ref: Radiographics (2007); 1:237-257.*

**48** (a)
Cystic fibrosis produces a range of abnormalities, which may lead to fibrosis, cirrhosis and portal hypertension. A micro-gallbladder is also seen commonly.

*Ref: Radiographics (2006); 26:679-90.*

**49** (d)
Jejunisation of the ileum is a feature of coeliac disease. In addition to the other features, transmural ulceration, fistulae, stenoses and fold thickening may be seen. Crohn's disease may affect any part of the GI tract, from mouth to anus.

*Ref: R-ITI 3_054. Crohn's disease.*

**50** (a)
Direct inguinal hernias originate infero-medial to the inferior epigastric artery, whilst indirect originate supero-laterally. Spigelian hernias lie at the linea semilunaris, hypogastric hernias lie in the midline below the umbilicus and femoral hernias pass through the femoral canal.

*Ref: R-ITI 3_009. Abdominal wall hernia.*

# Genito-urinary, Adrenal, Obstetrics & Gynaecology and Breast Practice SBA Questions

1 **A 62 year old female is found to have a localised 4 mm area of architectural distortion and deformity on routine screening mammography. It has multiple long, thin spicules clumped centrally with radiolucent linear structures paralleling the spicules. MRI shows a stellate lesion with equivalent signal intensity to surrounding parenchyma on T1 weighted imaging and slight enhancement after the administration of contrast medium.**

**Which of the following conditions is least likely?**

(a) Ductal breast carcinoma
(b) Fat necrosis
(c) Post surgical scar
(d) Radial scar
(e) Phyllodes tumour

2 **Following the administration of intravenous contrast medium for an IVU, the patient becomes rapidly unwell with hypotension, bradycardia and shortness of breath.**

**Which of the following treatments should not be used?**

(a) Oxygen delivered *via* a face mask
(b) Beta-2 agonist delivered *via* a nebuliser
(c) Adrenaline 1:1,000 0.3 mls intravenously
(d) Atropine 0.6 mg intravenously
(e) Normal saline intravenously

3 **A 42 year old man presents with a non-tender testicular lump. On examination he is noted to have gynaecomastia. The β-HCG, α-fetoprotein and lactate dehydrogenase levels are within normal limits. US demonstrates an irregular hypoechoic nodule.**

**What is the most likely diagnosis?**
(a) Choriocarcinoma
(b) Leydig cell tumour
(c) Lymphoma
(d) Seminoma
(e) Yolk sac tumour

4 **A 56 year man presents with hypertension and headache. He undergoes renal investigations which show a small right kidney on US and prolonged nephrogenic phase on contrast enhanced CT. MRA shows a 50% stenosis in the right main renal artery 1 cm from the ostium.**

**What is the most likely diagnosis?**
(a) Atherosclerosis
(b) Fibromuscular dysplasia
(c) Infrarenal aortic aneurysm
(d) Buerger's disease
(e) Polyarteritis nodosa

5 **A 28 year old man presents with loin pain and dipstick positive haematuria. A CT KUB is arranged for further investigation.**

**Which of the following statements is not correct regarding this investigation?**
(a) It is now the initial investigation of choice
(b) Indinavir related calculi are not well seen
(c) Urate calculi are well visualised
(d) Nephrocalcinosis may result in a false positive examination
(e) The 'comet tail' sign confirms a ureteric calculus rather than phlebolith

6 **A 58 year old man presents after an occupational health check revealed a PSA of 1.1 ng/ml. He has a slightly firm left side of the prostate on digital rectal examination.**

**Which of the following statements is correct?**

(a) Prostate biopsy is not indicated
(b) Six core biopsies should be performed during transrectal prostate biopsy
(c) Local anaesthetic is not required for transrectal prostate biopsies
(d) Antibiotic prophylaxis is mandatory for transrectal prostate biopsies
(e) A 12 MHz probe should be used for transrectal prostate biopsies

7 **A 55 year old female presents with postcoital bleeding and is discovered to have cervical carcinoma. Staging investigations reveal the tumour extends beyond the uterus with parametrial invasion but does not extend to the pelvic sidewall.**

**What is the FIGO staging of this tumour?**

(a) I
(b) II
(c) III
(d) IV
(e) V

8 **A 22 year old woman is diagnosed with an extra-adrenal phaeochromocytoma and undergoes an $I^{123}$ MIBG examination as part of his staging.**

**Which of the following organs does not usually take up MIBG?**

(a) Adrenal glands
(b) Spleen
(c) Ovaries
(d) Salivary glands
(e) Myocardium

9 **A 26 year old, otherwise fit and well female patient is referred for a pelvic US as part of her routine investigations for infertility. US shows an 8 cm right complex adnexal mass with echogenic and anechoic components. CT shows a mass of fat density floating in an interface between two water density components. MRI shows a hyperintense mass on T2W lesion with a fluid-fluid level.**

**What is the likeliest diagnosis?**

(a) Tubo-ovarian abscess
(b) Endometrioma
(c) Ovarian carcinoma
(d) Dermoid cyst
(e) Haemorrhagic cyst

10 **With regards to embolisation treatment of varicocoeles, which of the following statements is false?**

(a) The right side is easier to embolise than the left
(b) Coils are the embolisation material of choice
(c) The internal spermatic vein is occluded
(d) Testicular venous rupture is a recognized complication
(e) Bilateral varicocoeles can be approached through the same puncture site

11 **A 30 year old man presents with bilateral loin pain. KUB shows coarse granular calcification widely distributed in the region of the renal pyramids. US shows increased echogenicity of the renal pyramids with some posterior acoustic shadowing.**

**Which of the following is least likely?**

(a) Alport syndrome
(b) Medullary sponge kidney
(c) Milk-alkali syndrome
(d) Hyperparathyroidism
(e) Renal tubular acidosis

**12 A 24 year old female patient with a regular 28 day menstrual cycle undergoes a transvaginal US examination as part of her investigations for dyspareunia. She cannot recall when her last menstrual period began. US shows bright central line, with a markedly echogenic smooth endometrium measuring 14 mm. Mild echogenic posterior acoustic enhancement is seen with a thin hypoechoic halo of inner myometrial zone.**

**Which of the following statements is correct?**

(a) She should be referred for biopsy/dilation and curettage
(b) She is in the proliferative phase of her menstrual cycle
(c) She is in the secretory phase of her menstrual cycle
(d) The report should not mention her unknown LMP
(e) She is in the ovulatory phase of her menstrual cycle

**13 A 60 year old man presents with biliary colic. At US an incidental finding of a well-demarcated 5 cm mass of low echogenicity is noted arising from the right kidney. CT confirms a renal mass with a central low attenuation scar. MRI shows the mass to be hypointense on T1W and hyperintense on T2W with enhancement after *i.v.* gadolinium administration, although the central scar enhances less well than the remainder of the mass.**

**What is the likeliest diagnosis?**

(a) Renal cell carcinoma
(b) Oncocytoma
(c) Transitional cell carcinoma
(d) Hamartoma
(e) Metastasis

**14 A 45 year old woman undergoes a PET-CT as part of her investigations for cervical cancer.**

**Which of the following is the least likely to cause a false-positive result?**

(a) Physiological uptake in bowel
(b) Bladder diverticulum
(c) Uterine fibroids
(d) Endometriosis
(e) Ovarian cyst

15 **A 38 year woman who had undergone breast augmentation for cosmesis 5 years earlier presents complaining of loss of contour of her left breast and some associated pain. MRI shows multiple hypointense wavy lines within the implant.**

**What sign is described?**
(a) McGregor's sign
(b) Rubber band sign
(c) Linguine sign
(d) Wire sign
(e) Ladder sign

16 **A 32 year old woman with a history of multiple previous basal cell carcinomas of the skin undergoes a pelvic US. This shows a 5 cm solid-looking hypoechoic left ovarian mass. MRI shows the mass is well circumscribed, relatively homogeneous and of low signal intensity on T1 and T2.**

**What is the most likely diagnosis?**
(a) Ovarian adenocarcinoma
(b) Cystadenocarcinoma
(c) Brenner tumour
(d) Ovarian fibroma
(e) Endometrioma

17 **A 19 year old female patient presents with a history of amenorrhoea. On examination she is noted to be overweight, hirsute, the blood sugar is raised on pin-prick testing. An underlying endocrine disorder is suspected.**

**Which of the following features would not be in keeping with this diagnosis?**
(a) Bilateral ovarian volumes of 20 mls
(b) Bilateral ovarian volumes of 5 mls
(c) 10 small peripheral 5–8 mm cystic lesions on either side
(d) Asymmetrical ovarian size
(e) Patient's age

**18 With regards to MRI protocols for the assessment of endometriosis, which of the following statements is incorrect?**

(a) A pelvic surface coil improves image quality
(b) T1W sequences post gadolinium administration is employed
(c) T2W spin echo sequences are routinely employed
(d) A smooth muscle relaxant improves image quality
(e) T2W gradient echo sequences are not routinely employed

**19 An 80 year old woman presents with vague lower abdominal pain. AXR shows translucent linear streaky areas in the pelvis. USS shows a thickened bladder wall with echogenic foci within it. CT demonstrates areas of gas within the bladder wall.**

**Which of the following is not consistent with the described condition?**

(a) Diabetes mellitus
(b) The patient's demographics
(c) Staphylococcal infection
(d) Tuberculosis
(e) Bladder outlet obstruction

**20 A patient is diagnosed with a 4 cm right upper pole renal cell carcinoma. Staging investigations demonstrate tumour thrombus in the renal vein extending into the IVC, but no local lymphadenopathy and no evidence of distant metastases.**

**What is the Robson staging of this tumour?**

(a) Stage II
(b) Stage IIIa
(c) Stage IIIb
(d) Stage IIIc
(e) Stage IV

21 **A 24 year old with known ureteric reflux disease in childhood presents with loin pain. KUB shows an extensive calculus involving the lower pole and interpolar calyces.**

**What is the likeliest composition of the stone?**
(a) Magnesium ammonium phosphate
(b) Xanthine
(c) Cysteine
(d) Urate
(e) Calcium oxalate

22 **Regarding prostate sarcoma in adult patients, which of the following statements is correct?**

(a) Rhabdomyosarcoma is the commonest subtype
(b) The PSA is usually elevated
(c) The prostate is not usually enlarged
(d) Calcification is typical
(e) Heterogeneous enhancement with cystic change is typical

23 **A 23 year old man is diagnosed with a stage I germ cell tumour of the testis.**

**After primary treatment, what is the current method of choice for surveillance of the retroperitoneum?**
(a) Serial US
(b) Serial MRI
(c) Serial CT
(d) Serial laparoscopy
(e) Serial lymphangiography

24 **A 10 year old boy, recently arrived from the Indian subcontinent, presents with vague abdominal distension and discomfort. US shows bilateral multiple, non-communicating, well defined cystic lesions in the peripelvic region, renal parenchyma and in the perirenal spaces. CT shows the lesions to be homogeneous with no significant contrast enhancement. At MRI the lesions were of low signal intensity on T1W and high signal intensity on T2W, again without enhancement. Needle biopsy showed areas of connective tissue with an endothelial lining.**

**What is the likeliest diagnosis?**

(a) Multicystic dysplastic kidney
(b) Multilocular cystic nephroma
(c) Tuberculosis
(d) Wilm's tumour
(e) Renal lymphangiectasia

25 **A 30 year old patient is admitted with multiple stab wounds to the lower abdomen. His pulse is 110/ min and his blood pressure 80/40 mm Hg after fluid resuscitation. He has frank haematuria. A urethral catheter is passed freely and a normal cystogram performed in the emergency department. Initial CT in the portal venous phase with shows free fluid in the pelvis towards the right side but no major injury to the solid viscera. A ureteric injury is suspected.**

**Which imaging investigation would you recommend next?**

(a) Single shot IVU
(b) Full IVU with delayed phase imaging
(c) Ultrasound kidneys
(d) Retrograde ureterogram
(e) Nephrostomy insertion followed by nephrostogram

**26 A 60 year old man presents with frank haematuria. Cystoscopy demonstrates a transitional cell carcinoma of the bladder.**

**Which of the following statements is true regarding his staging investigations?**

(a) CT has no role
(b) Extension of the tumour into the outer half of the muscle layer is stage T2a disease
(c) At MRI tumour is isointense to muscle on T1W and hyperintense on T2W
(d) T2W is the optimal sequence to detect extension into perivesical fat
(e) T1W is the optimal sequence to assess depth of muscle invasion

**27 A number of special techniques are employed in mammography as opposed to conventional radiography.**

**Which of the following is not included in this category?**

(a) The use of a molybdenum target
(b) The use of a tungsten target
(c) A low tube current
(d) A focal spot size of 0.3 mm
(e) The use of a grid

**28 A 34 year old woman presents with left lower abdominal pain. US shows a complex adnexal lesion which cannot be fully characterised. MRI shows a 5 cm fluid filled structure with incomplete non-enhancing plicae crossing it and with areas of focal narrowing and peripheral small low signal intensity nodules on T2W. Amorphous shading of the lesion is also seen on T2W. Enhancement of the wall of the lesion after gadolinium administration is noted. Normal ovarian tissue is seen stretched around the lesion.**

**What is the most likely diagnosis?**

(a) Endometriosis
(b) Ovarian mucinous carcinoma
(c) Fallopian tube carcinoma
(d) Pyosalpinx
(e) Lymphangioma

29 **A 6 week pregnant lady presents to the early pregnancy unit with PV bleeding. As part of the US examination, crown-rump length (CRL) and mean gestational sac diameter (MGSD) measurements are recorded.**

**Which of the following is not correct?**

(a) Lack of detectable cardiac activity in a 8 mm CRL embryo is normal
(b) MGSD of 25 mm on transabdominal US should have a detectable embryo
(c) MGSD of 20 mm on transabdominal US should have a detectable yolk sac
(d) MGSD of 20 mm on transvaginal US should have both detectable yolk sac and embryo
(e) Cardiac activity may be detected in embryos with a CRL as small as 2 mm

30 **A 45 year old previously well woman presents with a breast lump. US shows a round lesion of mixed attenuation. Biopsy determines that the lesion is a metastasis and has significant areas of haemorrhage within it. The other breast is normal.**

**What is the most likely primary tumour?**

(a) Malignant melanoma
(b) Ovarian carcinoma
(c) Lung carcinoma
(d) Kaposi sarcoma
(e) Renal oncocytoma

31 **A 4 year old is found to have unilateral adrenal calcification on CT.**

**Which of the following is the least likely cause?**

(a) Adrenal cyst
(b) Neuroblastoma
(c) Ganglioneuroma
(d) Wolman disease
(e) Adrenocortical carcinoma

**32 A patient undergoes an unenhanced CT of the abdomen and suspicion of a left adrenal mass is raised.**

**Which of the following would not help differentiate a true adrenal lesion from a structure mimicking it?**

(a) Oral contrast administration to exclude a gastric diverticulum
(b) Intravenous contrast medium to ensure homogeneity of a splenunculus with the spleen
(c) Intravenous contrast medium to ensure a pancreatic tail mass is displacing the splenic vein anteriorly
(d) CT imaging with multi-planar reconstructions to ensure that the upper pole of the left kidney is not mimicking a mass
(e) MRI to ensure the upper pole of the left kidney is not the presumed mass

**33 A 30 year old man presents with recurrent loin pain. Ultrasound shows a horseshoe kidney.**

**Which of the following statements is incorrect?**

(a) The incidence at autopsy is 1:2,000
(b) Fusion of the kidneys occurs at the lower pole in 90%
(c) It is more common in males
(d) Ascent of the kidney is arrested at the L3 level by the inferior mesenteric artery
(e) It is seen in 60% of patients with Turners syndrome

**34 With regards to a $^{99m}$Tc-MAG3 renogram, which of the following statements is incorrect?**

(a) The pure blood flow phase lasts for 2 minutes
(b) The uptake phase should be measured 60–120 secs after tracer administration
(c) The peak of the curve represents the maximum activity in the kidney
(d) Frusemide should be administered in the presence of dilatation.
(e) A renal tumour would cause a photopaenic area within the kidney

**35 A 60 year old woman undergoes a CTPA. Incidental note is made of a solitary lesion within her breast.**

**Which of the following is more supportive of this being a benign process?**

(a) Irregular margin
(b) Irregular shape
(c) Rim enhancement
(d) Large calcifications
(e) Skin thickening

**36 With regards to the normal anatomy of the breast which of the following statements is true?**

(a) 30% of the lymphatic drainage is *via* the internal mammary chain
(b) Level I lymph nodes lie lateral to the medial edge of pectoralis minor
(c) Level II lymph nodes lie behind pectoralis major
(d) The breast consists of 15–20 terminal duct lobular units
(e) Increased enhancement of normal breast parenchyma during lactation is seen at MRI

**37 A 37 year old female patient with suspected pelvic malignancy undergoes an MRI with diffusion weighted imaging. There is an area of slight T2 hyperintensity which shows high signal intensity on high b-value source images and decreased signal on the ADC map.**

**What is the most likely diagnosis?**

(a) Liquefactive necrosis
(b) Fibrous tissue
(c) T2-shine through
(d) Cyst
(e) High-cellularity tumour

**38 A 2 cm adrenal lesion is noted in a 52 year old woman undergoing a staging CT for lung carcinoma. A dedicated study demonstrates the lesion to have a density of 18 HU before contrast medium, 68 HU in the portal venous phase and 57 HU at 10 minutes.**

**What is the most likely diagnosis?**

(a) Cyst
(b) Adenoma
(c) Metastasis
(d) Lipoma
(e) Adrenocortical carcinoma

**39 A 53 year old female patient has recently moved to the area and you are asked to review her most recent mammogram prior to clinic review. The mammogram shows a unilateral diffuse increased density of the right breast with skin thickening, a coarse reticular pattern with prominent Cooper's ligaments and no microcalcification.**

**Which of the following is the least likely to cause these appearances?**

(a) Radiotherapy change
(b) Lymphatic obstruction
(c) Inflammatory carcinoma
(d) Granular cell tumour
(e) Recent surgery

**40 With regards to the anatomy of the retroperitoneum, which of the following statements is true?**

(a) The right perirenal space communicates with the bare area of the liver
(b) The left perirenal space communicates with the scrotum
(c) The adrenal gland is in the anterior pararenal space
(d) The psoas muscle is in the posterior pararenal space
(e) The posterior pararenal space contains the ascending and descending colon

**41 A 53 year old asymptomatic man is discovered to have a 1.5 cm unilateral, calcified, extrarenal solitary renal artery aneurysm.**

**Which of the following statements is incorrect?**

(a) The lesion should be treated surgically
(b) 2/3 of renal artery aneurysms are extrarenal
(c) The likeliest cause is atherosclerosis
(d) Ehlers-Danlos syndrome is a cause
(e) It is more common in women

**42 A neonate is found to have an abdominal wall defect and bilateral cryptorchidism.**

**Which of the following features would not support a syndromic diagnosis?**

(a) Bilateral ureteromegaly
(b) Trabeculated low capacity bladder
(c) Widened prostatic urethra
(d) Urethral dilatation
(e) Asymmetric renal size

**43 A 35 year old man with a history of ataxia presents unconscious after a fall. A previous unenhanced CT abdomen demonstrated multiple solid lesions within the right kidney, an absent left kidney with surgical clips nearby and multiple well-defined cystic lesions within the pancreas.**

**What is the most likely diagnosis?**

(a) Tuberous sclerosis
(b) Amyloidosis
(c) Von Hippel Lindau syndrome
(d) Neurofibromatosis type 1
(e) Lymphoma

**44 A 48 year old female patient presents to the breast clinic with a painless breast lump. Clinical examination reveals a firm 2 cm mass in the right upper outer quadrant. Mammography shows a round, well defined soft tissue opacity in the corresponding location.**

**Which of the following features on US suggest a malignant rather than benign cause?**

(a) It is taller than it is wide
(b) It is markedly hyperechoic
(c) It has a thin echogenic capsule
(d) It has 3 lobulations
(e) It does not cast an acoustic shadow

**45 A 35 year old woman presents with a history of loin pain. CT shows a large perinephric haematoma. She cannot recall any significant trauma other than whilst playing with her child.**

**Which of the following is the least likely cause?**

(a) Multicystic dysplastic kidney
(b) Renal cell carcinoma
(c) Autosomal dominant polycystic kidney disease
(d) Polyarteritis nodosa
(e) Angiomyolipoma of the kidney

**46 A 3 year old undergoes CT of the abdomen which shows an 8 cm heterogeneous enhancing mass which does not extend across the midline, but which displaces major vessels.**

**Which of the following conditions is not associated?**

(a) Cryptorchidism
(b) Hypoplasia of the iris
(c) Hemihypertrophy
(d) Drash syndrome
(e) Proptosis

47 **A 32 year old woman undergoes an IVU which demonstrates bilateral striated nephrograms.**

**Which of the following is least likely?**
(a) Tamm-Horsfell proteinuria
(b) Hypotension
(c) Amyloidosis
(d) Acute pyelonephritis
(e) Medullary sponge kidney

48 **A 50 year old man presents 4 weeks after a bout of acute epididymitis with fever, leucocytosis, a swollen foul smelling, red, tender scrotum with palpable crepitus. The degree of inflammation is observed to be rapidly spreading over a 24 hour period.**

**Which of the following statements is true?**
(a) MRI is the best test to investigate extent of spread
(b) Ultrasound is useful in investigating the extent of spread
(c) CT is the best test to investigate the extent of spread
(d) Anaerobes are the most common responsible organism
(e) Staphylococcus is the most common responsible organism

49 **A 50 year old man is found to have an incidental renal lesion. On unenhanced CT, the lesion is 2 cm, round, homogeneous, well defined, without calcification and situated in the upper pole of the right kidney. It has an attenuation of 60 Hounsfield units, which after the administration of intravenous contrast medium increases to 69 HU.**

**Which of the following is the likeliest diagnosis?**
(a) Renal cell carcinoma
(b) Lipid poor angiomyolipoma
(c) Renal oncocytoma
(d) Simple cyst
(e) Metanephric adenoma

**50 A 14 year old girl presents with lower abdominal pain. Transabdominal ultrasound shows a partially solid/partially cystic midline mass.**

**Which of the following radiological features would not support a diagnosis of ovarian torsion?**

(a) Enhancement of the solid component on CT
(b) Free fluid in the *cul-de-sac* on US
(c) Multiple peripheral cysts on US
(d) High signal intensity on fat suppressed T1
(e) Wall thickness of 12 mm on MRI

# Genito-urinary, Adrenal, Obstetrics & Gynaecology and Breast Practice SBA Answers

**1** (e)
Phyllodes tumours present in the 5th-6th decades with a large firm, discrete mobile palpable mass. They demonstrate strong contrast enhancement on T1 weighted imaging. A small non-palpable stellate lesion on mammography with architectural distortion has a wide differential including primary carcinoma (up to 50%), fat necrosis, radial scar, fibrosed fibroadenoma and granular cell myoblastoma.

*Ref: Radiology Review Manual, 6th Ed, p. 545.*

**2** (c)
Adrenaline is used in the treatment of severe contrast reactions; however the 1:1,000 concentration should only be given *via* the intramuscular route. The spectrum of contrast reactions is wide and treatments range from simple supportive measures such as leg elevation and oxygen for mild vasovagal episodes through to adrenaline and H1 antagonists with airway support for severe anaphylactic reactions.

*Ref: RCR- Standards for iodinated intravascular contrast agent administration to adult patients 2005 (updated 2009).*

**3** (b)
Leydig cell tumours represent 1–3% of all testicular cancers, and are most common in men aged 30–60 years. They are stromal tumours, which form in the interstitial tissues that support the testes. The Leydig cells produces hormones, thus such tumours are typically hormonally active and lead to feminising or virilising syndromes; 30% secrete estradiol, resulting in gynaecomastia. β-HCG, α-FP and LDH levels are typically normal (β-HCG is 'always' raised in choriocarcinoma and in 83% of seminomas; α-FP is raised in >90% of yolk sac tumours).

*Ref: Radiology Review Manual, 6th Ed, p. 975-9.*

**4** (a)
Overall, atherosclerosis is the commonest cause of RAS. It has a particular tendency to involve the proximal 2 cm of the main renal artery in contradistinction to fibromuscular dysplasia, the second most common cause.

*Ref: Radiology Review Manual, 6th Ed, p. 956.*

**5** (e)
Indinavir and pure matrix calculi are the only types of stone not well visualized on CTKUB. The 'soft tissue rim' sign refers to circumferential thickening of the ureteric wall around a calculus as opposed to the 'comet tail' sign which is seen around phleboliths.

*Ref: RITI 4_047 Imaging loin pain and renal colic.*

**6** (d)
Elevated PSA or an abnormal DRE are indications for biopsy in asymptomatic men. The sextant biopsy protocol has now been found to give too many false negatives and has been largely replaced by extended core protocols. Local anaesthesia and antibiotic cover are now standard care. A 5-7.5 MHz probe is usually used.

*Ref: International Handbook of Prostate Cancer, 3rd Ed, 2007.*

**7** (b)
This is a FIGO II lesion, *i.e.* one where the tumour extends beyond the uterus but not to the pelvis sidewall or to the lower third of the vagina. Stage IIA lesions do not have parametrial invasion and are surgically treated lesions. Stage IIB do exhibit parametrial invasion and should be treated with chemo-radiotherapy. Stage III tumours extend to the pelvic sidewall, involve the lower third of the vagina or cause hydronephrosis. Stage IV tumours invade the bladder or rectum, or have distant metastases. Stage IV does not exist.

*Ref: RITI 4b_010 Staging cervical and endometrial cancer.*

**8** (c)
In addition to the above MIBG is taken up (to a variable extent) by liver, lung, colon, stomach and thyroid. It is uncommon to see uptake in the adrenal glands with $I^{131}$MIBG (<20%) but faint uptake is commonly seen with $^{123}$I-MIBG. Ovaries do not take up MIBG.

*Ref: Eur J Endocrinology (2002); 147(1):13–28.*

**9** (d)
Dermoid cysts are common congenital benign germ cell tumours that usually present in the reproductive age range. 15% are bilateral. They have a spectrum of appearances ranging from the classic fat or bone containing lesions to (less commonly) a predominantly cystic lesion with a fluid-fluid level. They can be diagnosed on plain radiographs in up to 40% of cases when the presence of fat, teeth or bone can be identified. They can be complicated by malignant degeneration (in 1-3%), torsion (4-16%) and rupture (rarely).

*Ref: Radiology Review Manual, 6th Ed, p. 1034.*

**10** (a)
The right renal vein drains directly into the IVC thus making it harder to approach. A right internal jugular approach may help in this situation.

*Ref: RITI 1c_049 Varicocoele, key facts, imaging and treatment.*

**11** (a)
Medullary nephrocalcinosis has a wide differential diagnosis, but options (b), (d) and (e) account for 70% of cases. Other causes include papillary necrosis and drugs such as Frusemide. Alport syndrome (hereditary chronic nephritis) typically gives rise to cortical calcification.

*Ref: Radiology Review Manual, 6th Ed, p. 893.*

**12** (c)
An endometrial thickness of up to 16 mm may be seen in the secretory phase of the menstrual cycle. This is maximal during the mid-secretory phase. It is imperative to include the LMP, whether known or unknown as part of the report. In the proliferative phase (day 6-14), endometrial thickness is 5–7 mm and in the periovulatory phase, endometrial thickness up to 11 mm is seen.

*Ref: Radiology Review Manual, 6th Ed, p. 1024.*

**13** (b)
In addition to the above findings, a 'spoke-wheel' appearance at angiography and a photopaenic area on $^{99m}$Tc-DMSA scan may be seen.

**14** (e)
$^{18}$FDG shows physiological uptake in brain, myocardium, liver, spleen, bone marrow, GI tract, testes, and skeletal muscle and is excreted by the kidneys. Increased uptake is also seen in healing fractures, inflammatory and granulomatous disease and infectious processes.

*Ref: Radiographics (2005); 25:1031–43.*

**15** (c)
Implant rupture is a not uncommon complication with a prevalence of more than 50% at 12 years. US (59–70% sensitive, 57–92% specific) is less accurate than MRI (81–94% sensitive, 93–97% specific). Classically on MRI, hypointense wavy lines often parallel to the fibrous capsule are seen (linguine sign).

*Ref: Radiology Review Manual, 6th Ed, p. 574.*

**16** (d)
Ovarian fibroma is a well defined tumour containing extensive collagen. It is associated with Gorlin's syndrome (fibromas seen in 17%) and occasionally presents as Meig's syndrome.

*Ref: Essentials of radiologic imaging (1998): 763–66.*

**17** (d)
The diagnosis of polycystic ovary syndrome is made on the basis of clinical and biochemical findings in conjunction with the sonographic findings, which alone are non-specific. Similar sized ovaries is a key finding. The classic finding of bilaterally enlarged ovaries with multiple small peripheral follicles is seen in 50%. Hyperechoic central stroma is also usually seen. Normal ovaries are seen in 25%.

*Ref: Polycystic ovary syndrome, 2nd Ed.*

**18** (b)
T1W imaging after the administration of intravenous gadolinium is not routinely employed for the assessment of endometriosis.

*Ref: RITI 4b_013 Endometriosis.*

**19** (d)
Emphysematous cystitis is usually seen in women over the age of 50 with poorly controlled diabetes mellitus. Other risk factors include neurogenic bladder and recurrent UTIs. Causes other than infection include trauma, recent instrumentation and enterovesical fistula. Classically the organism is *E. coli*, but a variety of organisms including *Staphylococcus, Streptococcus, Klebsiella* and *Clostridium perfringens* have been described. TB causes an irritable hypertonic low capacity bladder and occasionally calcification of the bladder wall is seen.

*Ref: Radiology Review Manual, 6th Ed, p. 926.*

**20** (b)
Stage I includes tumours that are confined entirely to the kidney. Stage II tumours invade the perinephric fat or adrenal gland on the same side. Stage IIIa tumours extend into the renal vein or the IVC. Stage IIIb tumours involve local LNs. Stage IIIc combines stages IIIa and IIIb. Stage IV tumours describes those with distant metastases.

*Ref: Primer of Diagnostic Imaging, 4th Ed, p. 291.*

**21** (a)
70% of staghorn calculi are composed of magnesium ammonium phosphate (struvite stones). The remainder are cysteine or urate stones. These large calculi are often seen in patients with a history of recurrent infections.

*Ref: Primer of Diagnostic Imaging, 4th Ed, p. 299.*

**22** (e)
Sarcoma of the prostate is a rare tumour characterized by a large heterogeneous enhancing mass. Rhabdomyosarcoma is more commonly seen in children; leiomyosarcoma more commonly in adults. The PSA is not usually affected due to the lack of epithelial involvement.

*Ref: Clin Rad (2009); 64(2):171.*

**23** (c)
In recent times imaging surveillance of the retroperitoneum after surgery has been developed as an acceptable strategy to reduce the chance of subsequent morbidity and mortality. CT currently remains the modality most commonly used, although concerns have been raised regarding the radiation dose in this group of young patients. This has led to potential interest in MRI but as yet, this has not been widely adopted.

*Ref: Clin Rad (2009); 64(4):362–7.*

**24** (e)
Although rare, renal lymphangiectasia has a characteristic imaging appearance resulting from the failure of the renal lymphatic tissue.

*Ref: Clin Rad (2008); 63(9): 1057–62.*

**25** (a)
Traumatic ureteric injury is extremely rare. In this situation with an unstable patient who will imminently require emergency surgery, a one shot IVU to localize the injury should be performed. If the patient was clinically stable, either CT with delayed phase imaging or a full IVU could be performed.

*Ref: Clin Rad (2008); 63(12): 1361–71.*

**26** (c)
MRI is the local staging investigation of choice. T2W is good for assessment of degree of muscle invasion and differentiating tumour from fibrosis, whilst T1W is good for assessing invasion into the perivesical fat. T2a disease involves the inner half of the muscle layer; T2b the outer half and T3 describes invasion of the perivesical fat.

*Ref: Radiology Review Manual, 6th Ed, p. 980–1.*

**27** (c)
High tube currents to reduce exposure time should be used. Molybdenum targets are used most commonly as they produce a low energy spectrum providing high contrast. Although tungsten targets produce higher energy spectra they are still used in situations where there is a thicker or a denser breast.

*Ref: Diagnostic Radiology, 5th Ed, p. 1173.*

**28** (d)
Pyosalpinx is characterized by dilatation of the fallopian tube with pus within it. It characteristically demonstrates amorphous or geographic shading on T2W.

*Ref: Clin Rad (2009); 64: 815–31.*

**29** (a)
The discriminatory level of CRL before lack of cardiac activity becomes abnormal is 6 mm. MGSD is defined as (length + width + height)/3.

*Ref: RITI 4b_005 Early pregnancy problems.*

**30** (a)
Haemorrhagic metastases to breast include melanoma, renal cell carcinoma, choriocarcinoma and Kaposi sarcoma. Overall, the commonest non-mammary source of non-haemorrhagic metastases is lymphoma.

*Ref: Radiology Review Manual, 6th Ed, p. 575.*

**31** (e)
Adrenocortical carcinoma is a cause of adrenal calcification but presents in an older age group (4th –7th decade).

*Ref: Radiology Review Manual, 6th Ed, p. 882.*

**32** (c)
The left adrenal gland lies in front of the upper pole of the left kidney and a mass within it can be confused with the upper pole itself, a gastric diverticulum, splenic lobulation, an accessory spleen or a mass in the tail of the pancreas. Such a mass in the pancreatic tail, would normally displace the splenic vein posteriorly rather than anteriorly as a true adrenal mass would.

*Ref: Aids to Radiological Differential Diagnosis, 4th Ed, p. 308.*

**33** (a)
It is the commonest fusion abnormality and is seen in 1:400 patients at autopsy. It can be complicated by obstruction, reflux or stone formation. The isthmus can contain functioning renal tissue.

*Ref: RITI 4c_048 Assessment of hydronephrosis and suspected ureteric obstruction.*

**34** (a)
The pure blood flow phase is the first phase of the examination and lasts up to 40 secs (equivalent to an arterial phase study).

*Ref: RITI 7r_003 Dynamic renography.*

**35** (d)
There are limited features to suggest benignity on CT examination. Rather, evaluation of these commonly seen incidental findings should be made by looking for the lack of malignant features and careful evaluation of the clinical history. Small, dystrophic calcification (which in some cases cannot be appreciated at CT resolution) rather than large, round calcifications is a predictor of malignancy.

*Ref: Radiographics (2007); 27:s37–51.*

**36** (e)

*Ref: RITI 4a_003 Breast anatomy, physiology and imaging.*

**37** (e)
Diffusion-weighted MRI is increasingly being used in body MRI and offers functional information over and above conventional morphological images. These features are typical of tumour.

*Ref: Radiographics (2009); 29:759–778.*

**38** (c)
Metastases typically have a higher density (>15 HU) with less washout in the portal venous phase than an adenoma. The adrenal gland is the most common site for metastases from bronchogenic carcinoma.

*Ref: Radiology (2008); 249(3):756–75.*

**39** (d)
These are mammographic signs of an oedematous breast and the differential diagnosis also includes venous obstruction and breast abscess. Granular cell tumour presents as an asymmetric lump with hardness, skin retraction and ulceration. It is typically a well seen spiculated mass 1–3 cm in diameter.

*Ref: Radiology Review Manual, 6th Ed, p. 570.*

**40** (a)
The psoas lies posterior to the posterior pararenal space. The adrenal gland is in the perirenal space. The ascending and descending colon are in the anterior pararenal space.

*Ref: Imaging (2000); 12:10–20.*

**41** (a)
A small (< 2 cm) renal artery aneurysm which is well calcified may be treated conservatively. Indications for surgery include being a woman of childbearing age (due to the increased risk of rupture in pregnancy), interval growth, emboli to kidney or diminishing renal function. Intrarenal aneurysms are most commonly congenital; true extra-renal aneurysms are caused by fibromuscular dysplasia, pregnancy and mesenchymal disease such as NF and Ehlers-Danlos, in addition to atherosclerosis.

**42** (b)
The classical triad of prune-belly syndrome is abdominal wall defect/ weakness, bilateral cryptorchidism and genito-urinary abnormalities. Typically a thickened, non-trabeculated, large volume bladder is seen. Non GU abnormalities affecting the lungs (CCAM, lung hypoplasia), musculoskeletal system (scoliosis, pectus excavatum), cardiovascular (VSD, PDA, Fallots) and GI system (Hirschprung's disease, malrotation) are also seen.

*Ref: Radiology Review Manual, 6th Ed, p. 950.*

**43** (c)
VHL disease is an autosomal dominant neurocutaneous syndrome characterised by renal cell carcinomas, often multiple and bilateral along with cystic renal and pancreatic disease, phaeochromocytomas and spinal, cerebellar and optic nerve haemangioblastomas. The cerebellar lesions can present as ataxia.

*Ref: Radiology Review Manual, 6th Ed, p. 335.*

**44** (a)
Malignant features on US include spiculation, being taller than wide, angular margins, acoustic shadowing, being markedly hypoechoic, and having microlobulations. Benign features include being hyperechoic, having 2-3 lobulations, being ellipsoid in shape and having a thin echogenic capsule. To characterise a lesion as being sonographically benign, it must have no malignant features. If specific benign features are not found then the lesion is indeterminate.

*Ref: Radiology Review Manual, 6th Ed, p. 546.*

**45** (a)
Occult RCC, polyarteritis nodosa, ADPKD and angiomyolipoma are well recognized causes of perinephric haematoma after innocuous trauma. MCDK do not typically bleed externally into the perinephric space.

*Ref: Radiology Review Manual, 6th Ed, p. 937.*

**46** (e)
The features described would suggest a diagnosis of Wilm's tumour which has a number of associations including Beckwith-Wiedemann syndrome, sporadic aniridia, hemihypertrophy and other genitourinary abnormalities including Drash syndrome. Proptosis can be seen in neuroblastoma.

*Ref: Radiology Review Manual, 6th Ed, p. 993.*

**47** (c)
Striated nephrograms are transiently seen in acute extra-renal obstruction along with hypotension and intratubular obstruction. Other causes of bilateral striated nephrograms include rhabdomyolysis and cystic renal disease. Causes of a (usually) single striated nephrogram include renal contusion and renal vein thrombosis.

*Ref: Radiographics (1995); 15: 1069–85.*

**48** (c)
Fournier's gangrene is a rapidly spreading necrotizing fasciitis that involves the genital or peri-anal regions. It usually has an identifiable predisposing event. It is polymicrobial in origin with *E. coli* being the commonest identifiable organism. CT is the best investigation for assessing the degree of spread, and can identify complications such as abscess formation. Treatment is urgent, complete debridement.

*Ref: Radiographics (2008); 28: 519–28.*

**49** (d)
Although most cysts are of low attenuation, by far the commonest cause of an otherwise benign appearing, non-enhancing (<10 HU increase), hyperattenuating (normal renal parenchyma approximately 40 HU on unenhanced CT) lesion is a hyperdense cyst containing proteinaceous material. Lipid poor angiomyolipomas are a rare (3–4%) subset of angiomyolipomas.

*Ref: Radiographics (2007); 27: 1131–43.*

**50** (a)
Lack of enhancement of the solid component of the mass is seen on CT and MRI. Other features include a whorled paraovarian structure on CT, representing the ovarian pedicle.

*Ref: Radiology Review Manual, 6th Ed, p. 1064.*

# Paediatrics Practice SBA Questions

1 **A 3 year old presents with entral epigastric pain. Blood tests reveal a raised amylase.**

**Which of the following is the least likely cause?**

(a) Choledochal cyst
(b) Cystic fibrosis
(c) Henoch-Schonlein purpura
(d) Non-accidental injury
(e) Rubella

2 **A 15 year old boy is under investigation for hypertension. The serum catecholamines and urinary VMAs are raised. CT abdomen confirms a left adrenal phaeochromocytoma and additionally shows multiple cysts within the liver, pancreas and both kidneys.**

**Which of following additional features would you look for?**

(a) Bilateral acoustic neuromas
(b) CNS haemangioblastomas
(c) Iris hamartomas
(d) Parathyroid adenomas
(e) Pulmonary lymphangioleiomyomatosis

3 **An antenatal US performed at 20 weeks demonstrated a right renal pelvis with an AP diameter of 5 mm. A 32 week scan shows the diameter to be 10 mm. The post-natal US at 4 days confirms unilateral right-sided neonatal hydronephrosis.**

**What is the commonest cause of these findings?**

(a) Ectopic ureterocoele
(b) Pelvi-ureteric junction obstruction
(c) Posterior urethral valve
(d) Prune-belly syndrome
(e) Vesico-ureteric junction obstruction

4 **A 1 year old boy presents with an acute history of cough, wheeze, and respiratory distress.**

**Which of the following is true?**

(a) Collapse of a lung or lobe is the commonest radiographic finding acutely
(b) An inhaled foreign body is equally likely to pass into either mainstem bronchus
(c) The majority of foreign bodies are radio-opaque and can be seen on CXR
(d) Mediastinal shift on expiratory radiographs/fluoroscopy is toward the lucent side
(e) Normal imaging excludes the diagnosis of inhaled foreign body

5 **The settings on the CT machine need to be optimised to reduce the dose when scanning paediatric patients. A student radiographer asks you how this can be achieved.**

**Which of the following will actually increase patient dose?**

(a) Reducing the gantry rotation speed
(b) Reducing the kVp
(c) Reducing the mA
(d) Reducing the scanned volume to only the abnormal region
(e) Use of automatic exposure control

6 **A 3 year old girl presents with increasing abdominal girth. US demonstrates a mass within the region of the left kidney. The patient proceeds to CT examination.**

**Which of the following findings favours Wilms' tumour over neuroblastoma?**

(a) Calcification within the mass
(b) Mass crosses the midline
(c) Mass encases and lifts the aorta
(d) Mass invades into the IVC
(e) Presence of bone metastases

7 **An 18 month old child presents with an unwitnessed head injury. There are elements of the history which appear inconsistent. The CT head examination demonstrates a subdural haematoma**

**Which of the following findings are least specific for NAI?**
(a) Associated presence of retinal haemorrhage
(b) Bilateral SDHs
(c) Interhemispheric (falx) SDH
(d) SDH of differing age
(e) SDH underlying a skull fracture

8 **A 3 year old boy presents with abdominal swelling. US and subsequent CT examination show a large 12 cm mass inferior to the liver. There is distortion of the renal parenchyma and apparent exophytic growth. There is poor enhancement and the aorta and IVC are displaced.**

**Which of the following features is not a known association?**
(a) Aniridia
(b) Cerebellar ataxia
(c) Horseshoe kidney
(d) Macroglossia
(e) Male pseudohermaphroditism

9 **A neonatal male patient failed to pass meconium by 48 hours and was found to have an imperforate anus of the high malformation subtype. A colostomy was formed in the neonatal period and surgical repair completed in infancy. At the age of 5 the patient presents with a UTI.**

**What is the likely underlying aetiology of the UTI?**
(a) Colovesical fistula
(b) Neurogenic bladder
(c) Pelvi-ureteric junction obstruction
(d) Rectourethral fistula
(e) Urethrocoele

**10 A 6 week old boy with a family history of developmental dysplasia attends the department for a screening US scan of the hips.**

**Which of the following imaging findings constitutes an abnormal result?**

(a) 60° for α-angle
(b) 60° for β-angle
(c) 60% of femoral head covered by acetabulum
(d) Femoral head lying inferio-medial to the Perkin's/ Hilgenreiner's line intersection
(e) Hypoechoic appearance of the femoral head

**11 An infant presents within the first few weeks of life with stridor, respiratory distress, and wheezing. CXR shows left deviation of the trachea, the lateral view reveals increased density in the region of the hilum. A pulmonary sling is suspected and a CT chest is arranged for further evaluation.**

**Which of the following findings is most likely to be seen?**

(a) Anterior trachea and anterior oesophageal compression
(b) Anterior trachea and posterior oesophageal compression
(c) No compression
(d) Posterior trachea and anterior oesophageal compression
(e) Posterior trachea and posterior oesophageal compression

**12 An 8 month old boy presents with prolonged cough. On examination there is reduced air entry on the right side. The subsequent CXR demonstrates mediastinal shift towards the left side of the chest.**

**Which of the following is more likely?**

(a) Congenital lobar emphysema
(b) Bronchogenic cyst
(c) Pulmonary agenesis
(d) Scimitar syndrome
(e) Swyer-James (McLeod) syndrome

13 **A 2 year old boy presents with haematochezia. He is in obvious distress on examination, but the bowel sounds are normal. AXR is unremarkable, and the paediatric team suspect a Meckel's diverticulum. Your advice is sought regarding further investigation.**

**Which of the following would be the most sensitive radiological investigation?**

(a) Barium follow-through
(b) CT
(c) MRI
(d) $^{99m}$Tc-pertechnatate scintigraphy
(e) Ultrasound

14 **An 18 month old boy is found to have a neuroblastoma. A subsequent CT is performed for staging purposes. This reveals the primary tumour and evidence of metastases in the skin, liver, lung and bone marrow.**

**What is the appropriate stage?**

(a) Stage I
(b) Stage II
(c) Stage III
(d) Stage IV
(e) Stage IV-S

15 **A 7 year old girl presents with lethargy, headaches and vomiting. CT shows a hyperdense lesion in the region of the posterior fossa. MR imaging confirms a midline vermian mass which abuts the roof of the 4th ventricle, displacing the brainstem anteriorly. The mass is hypointense on T2 and enhances homogeneously on T1 following *i.v.* contrast.**

**What is the most likely diagnosis?**

(a) Brainstem glioma
(b) Ependymoma
(c) Haemangioblastoma
(d) Medulloblastoma
(e) Pilocytic astrocytoma

**16 Which of the following types of craniosynostosis is correctly linked to the suture involved?**

(a) Anterior plagiocephaly – unilateral lambdoidal suture
(b) Brachycephaly – metoptic suture
(c) Posterior plagiocephaly – unilateral coronal suture
(d) Scaphocephaly – sagittal suture
(e) Trigonocephaly – bilateral coronal suture

**17 An 8 month old boy presents with red-currant jelly stool and abdominal distension. US confirms an intussusception and the paediatric surgeons ask you to attempt fluoroscopic reduction.**

**Which of the following is a contraindication to fluoroscopic reduction?**

(a) Age > 12 months
(b) Evidence of small bowel obstruction
(c) Free intra-peritoneal fluid
(d) Hypovolaemic shock
(e) US demonstrates fluid in the lumen around the intussusceptum

**18 A supine AXR is performed on a 4 day old neonate born at 32 weeks, who is noted to have increasing abdominal distension and appears clinically unwell.**

**Which of the following features is an indication for urgent surgery?**

(a) Air in the portal vein
(b) Adynamic ileus
(c) Pneumatosis intestalis
(d) Pneumobilia
(e) Pneumoperitoneum

**19 A 14 year old girl presents with abnormal curvature of the spine, there is no history of any back pain. On examination there is an obvious scoliosis.**

**Which of the following is the most likely as an underlying cause?**

(a) Neurofibromatosis type I
(b) Osteoid osteoma
(c) Hemivertebrae
(d) Facet joint OA
(e) TB of psoas muscle

**20 Which of the following conditions has the highest frequency of non-genitourinary anomalies?**

(a) Ask-Upmark kidney
(b) Bilateral ectopia
(c) Crossed-fused ectopia
(d) Duplex kidney
(e) Horseshoe kidney

**21 Antenatal US shows a RUQ cystic structure. A day 3 US shows an anechoic cyst with hyperechoic inner lining and a hypoechoic outer rim, causing superior-anterior displacement of the 1st and 2nd portion of the duodenum without bile duct dilation.**

**What is the most likely diagnosis?**

(a) Choledochal cyst
(b) Choledochocoele
(c) Duplication cyst
(d) Mesenteric lymphangioma
(e) Pancreatic pseudocyst

22 **A 15 year old boy under investigation for polyuria presents to A&E with an acute episode of dyspnoea. CXR reveals a small right-sided pneumothorax and lung cysts are noted.**

**What is the most likely underlying diagnosis?**

(a) α1-anti-trypsin deficiency
(b) Langerhans Cell Histiocystosis
(c) Lymphangiomyomatosis
(d) Neurofibromatosis
(e) Tuberous sclerosis

23 **Which of the following classifications of atria/viscera positioning relative to the midline is associated with the lowest frequency of congenital heart defects?**

(a) Situs ambiguous
(b) Situs inversus/dextrocardia
(c) Situs inversus/levocardia
(d) Situs solitus/dextrocardia
(e) Situs solitus/levocardia

24 **A 3 week old boy presents with high output cardiac failure. On examination he has a mass within the right upper quadrant. CT shows a large heterogeneous mass with central areas of low density, occupying the entire left lobe of the liver. The mass enhances peripherally in the arterial phase.**

**What is the most likely diagnosis?**

(a) Haemangioendothelioma
(b) Haemangiopericytoma
(c) Hamartoma
(d) Hepatoblastoma
(e) Hepatocellular carcinoma

**25 A 4 year old girl has a proven first UTI. *E. coli* is cultured and there is a good response to antibiotics. Her GP phones to ask your advice on the most appropriate way to proceed with imaging.**

**What should you recommend?**

(a) DMSA scan at 6 months
(b) MCUG at 6 weeks
(c) No imaging
(d) US acutely
(e) US at 6 weeks

**26 Which of the following types of polycystic kidney disease is associated with the greatest degree of liver fibrosis?**

(a) Autosomal dominant PKD
(b) Antenatal autosomal recessive PKD
(c) Infantile autosomal recessive PKD
(d) Juvenile autosomal recessive PKD
(e) Neonatal autosomal recessive PKD

**27 A 14 year old boy presents with mid/ lower back pain. He is noted to be kyphotic on examination. A lateral X-ray of the thoraco-lumbar vertebrae shows anterior wedging of the T8-10 vertebral bodies.**

**What is the most likely diagnosis?**

(a) Ankylosing spondylitis
(b) Eosinophilic granuloma
(c) Morquio's syndrome
(d) Osteogenesis imperfecta
(e) Scheuermann's disease

**28 A 3 year old boy presents with a first seizure; he is afebrile. CT scan shows calcification within the right parietal gyri with ipsilateral skull thickening and enlargement of the choroid plexus.**

**What is the likely diagnosis?**

(a) Klippel-Trenaunay syndrome
(b) Neurofibromatosis type 2
(c) Sturge-Weber syndrome
(d) Tuberous sclerosis
(e) von Hippel Lindau syndrome

**29 A 2 year old boy considered at high risk for NAI. An initial skeletal survey is performed and subsequently a bone scan is requested for additional evaluation.**

**Which of the following are not true regarding bone scintigraphy?**

(a) It is more sensitive than plain film
(b) It is more accurate in diagnosing skull fractures
(c) It is less accurate in diagnosing metaphyseal fractures
(d) It is less specific than plain film
(e) Scintigraphy cannot reliably differentiate old and new fractures

**30 A 3 day old baby has dyspnoea. The CXR shows shift of the mediastinum to the right; the left hemithorax is filled with multiple cyst-like structures. The stomach is centrally located and there is a paucity of bowel gas within the abdomen.**

**What is the most likely diagnosis?**

(a) Bochdalek hernia
(b) Bronchogenic cyst
(c) Congenital cystic adenomatoid malformation
(d) Extrapulmonary sequestration
(e) Septum transverum defect

**31 Which of the following features is not a feature of Juvenile Chronic Arthritis?**

(a) Growth retardation
(b) Iridocyclitis
(c) Rheumatoid factor positive
(d) Spinal involvement typically precedes peripheral arthritis
(e) Oligoarthritis

**32 A 3 week old, previously well baby present with cough and difficulty in breathing. On examination there is reduced air entry on the right. CXR reveals complete opacification of the right hemithorax. There is rib crowding on the right and the trachea is positioned to the right.**

**What is the most likely underlying cause?**
(a) Congenital cystic adenomatoid malformation
(b) Congenital diaphragmatic hernia
(c) Extra-pulmonary sequestration
(d) Mucous plugging
(e) Pleural effusion

**33 Regarding lung lesions in the paediatric population.**

**Which of the following conditions is the most likely to present as multiple pulmonary opacities?**
(a) Arterio-venous malformations
(b) Congenital cystic adenomatoid malformation
(c) Extralobar pulmonary sequestrations
(d) Intralobar pulmonary sequestrations
(e) Pulmonary hamartomas

**34 A 4 month old baby has a witnessed fall and head injury. The lateral skull view demonstrates no fracture, but shows multiple bones within the lambdoid suture.**

**Which of the following is the least likely cause?**
(a) Cleidocranial dysostosis
(b) Hypoparathyroidism
(c) Normal variant
(d) Osteogenesis imperfecta
(e) Pycnodysotosis

**35 A 3 year old presents with abdominal pain and vomiting. The paediatric surgeons are concerned about possible malrotation and request a plain film in the first instance.**

**What is the most common plain radiograph finding in malrotation?**

(a) Bowel wall oedema
(b) Caecum located on left side
(c) Normal
(d) Small bowel obstruction
(e) SMA lying to right of the SMV

**36 A 1 year old girl presents to A&E with a harsh cough, fever and stridor. A lateral neck X-ray shows normal supraglottic structures. The CXR shows narrowing of the sub-glottic airway.**

**What is the most likely diagnosis?**

(a) Croup
(b) Enlarged tonsils
(c) Epiglottitis
(d) Inhaled foreign body in RLL
(e) Vocal cord palsy

**37 A neonate has bile stained vomiting post feeding. The AXR shows a 'double bubble' sign?**

**Which of the following conditions is the least likely underlying cause?**

(a) Annular pancreas
(b) Duodenal atresia
(c) Ladd's bands
(d) Pre-duodenal vein
(e) Pyloric stenosis

**38 A 5 year old girl presents with a swelling on the left side of her neck. An MRI examination is subsequently arranged for investigation.**

**Which feature makes branchial cleft cyst more likely than cystic hygroma?**

(a) Associated coarctation of the aorta
(b) Extending between ECA/ICA
(c) Extension into mediastinum
(d) High signal on T2W MR imaging
(e) Multi-loculated appearance on US

**39 An antenatal US shows oligohydramnios, a protruberant abdomen, bilateral hydronephrosis and markedly dilated and tortuous ureter. The posterior urethra is dilated and there is a large distended thin-walled bladder. At birth the testicles are noted to be undescended.**

**What is the most likely diagnosis?**

(a) Cloacal abnormality
(b) Megacystis-microcolon-hypoperistalsis (MMH) syndrome
(c) Posterior urethral valves
(d) Prostatic rhabdomyosarcoma
(e) Prune-belly syndrome

**40 Which of the following causes of neonatal hydrocephalus is more likely to be communicating rather than non-communicating?**

(a) Aqueduct stenosis
(b) Arnold-Chiari syndrome
(c) Dandy-Walker syndrome
(d) Encephalocoele
(e) Germinal matrix haemorrhage

**41 A request is made for an MRI examination in a neonate. An antenatal US had revealed agenesis of the corpus callosum. The MRI scan shows an abnormal posterior fossa.**

**Which of these features make Dandy-Walker a more likely diagnosis than Chiari II malformation?**

(a) Hydrocephalus
(b) Klippel-Feil anomaly
(c) Large posterior fossa
(d) Syringohydromyelia
(e) 'Towering' cerebellum

**42 A pregnant mother with low α-FP, increased β-hCG and decreased unconjugated oestriol on screening is considered high risk for carrying a baby with Down's syndrome. An 18 week anomaly US is arranged.**

**Which of the following findings indicative of Down's syndrome is least likely to be seen?**

(a) Cystic hygroma
(b) Duodenal atresia
(c) Omphalocoele
(d) Increased nuchal thickness
(e) Short femur length

**43 Regarding duplication cysts of the gastro-intestinal tract in neonates.**

**Where is the commonest location?**

(a) Duodenum
(b) Ileum
(c) Jejunum
(d) Oesophagus
(e) Stomach

**44 A 9 year old child presents following an RTA. Prelimary 'FAST' scan US in A&E shows intra-abdominal free fluid. The child is resuscitated and a CT requested to help identify a bleeding site.**

**Which of the following is not a recognised feature of hypovolaemia with CT?**

(a) Small hypodense spleen
(b) Reduced renal enhancement
(c) Small bowel dilatation
(d) Collapsed IVC
(e) Pancreatic enhancement

**45 An infant is seen by the GP non-acutely, with stridor. He is systemically well and is not in distress. Tracheomalacia is suspected as a possible cause and further investigations are arranged.**

**Regarding tracheomalacia, which of the following statements is correct?**

(a) It is associated with tracheo-oesophageal fistula
(b) It is the commonest cause of inspiratory stridor
(c) Expiratory CT is the definitive method of diagnosis
(d) Resolution occurs in late childhood
(e) The trachea typically collapses in inspiration

**46 A 15 year old girl presents with gradually increasing bilateral hip pain. Pelvic X-ray reveals bilateral sclerosis of the femoral head, with lucent crescents paralleling the articular surface and subchondral cysts. The acetabulum is normal and the epiphyseal height and alignment is preserved. She had an episode of right hip pain 1 year ago and the X-ray was reported as normal.**

**Which of the following is the most likely diagnosis?**

(a) Developmental dysplasia of the hips
(b) Diaphyseal achlasia
(c) Perthe's disease
(d) Sickle cell disease
(e) Slipped upper femoral epiphyses

**47 Regarding the normal anatomy of the umbilical cord, there is:**

(a) 1 umbilical artery, 1 umbilical vein
(b) 1 umbilical artery, 2 umbilical veins
(c) 2 umbilical arteries, 1 umbilical vein
(d) 2 umbilical arteries, 2 umbilical veins
(e) No 'normal number' as it is common to have different combinations of umbilical arteries/veins as an anatomical variant

**48 A 4 week old baby is cyanosed and has a heart murmur. The CXR reveals pulmonary oedema with widening of the superior mediastinum to produce a 'snowman' ('cottage loaf') appearance.**

**What is the likely type of total anomalous pulmonary venous connection (TAPVC) present?**

(a) Cardiac
(b) Infracardiac
(c) Mixed
(d) Scimitar syndrome
(e) Supracardiac

**49 A 10 year old boy presents to his GP with back pain. He is found to have a scoliosis, but is also noted to be tall for his age and rather thin.**

**Which of the following supports the diagnosis of Marfan's syndrome over homocystinuria?**

(a) Aortic aneurysm
(b) Lens dislocation
(c) Mental retardation
(d) Osteoporosis
(e) History of pulmonary emboli

**50 An antenatal US shows a myelomeningocoele of the lower cord, but normal cranial appearances. A post-natal lateral skull X-ray reveals multiple ovoid lucencies with thinning of the inner table of the calvarium, clustered within in the parietal and occipital bones.**

**What is the most likely diagnosis?**

(a) Convolutional markings
(b) Dermoid cyst
(c) Epidermoid cyst
(d) Lacunar skull
(e) Langerhans cell histiocytosis

# Paediatrics Practice SBA Answers

**1** (c)
Trauma (including NAI) is one of the leading causes of pancreatitis in the paediatric population. Other causes include cystic fibrosis, hyperlipidaemia syndromes, drugs, viral, hyperparathyroidism, hypercalcaemia, idiopathic, Pearson syndrome (mitochondrial disorder), Schwachman-Diamond syndrome, and anatomical anomaly (pancreas divisum).

*Ref: Primer of Diagnostic Imaging, 4th Ed, p. 902.*

**2** (b)
VHL is associated with CNS haemangioblastomas in 50%, pancreatic/ hepatic/ renal cysts, RCC, and phaeochromocytoma (10%). Phaeochromocytomas are also associated with MEN types 2A and 2B (also medullary thyroid cancer, parathyroid adenomas), NF-1, and tuberous sclerosis. Bilateral acoustic neuromas are associated with NF-2.

*Ref: Radiology Review Manual, 6th Ed, p. 943–4 & Primer of Diagnostic Imaging, 4th Ed, p. 576–80.*

**3** (b)
The most common causes of antenatal hydronephrosis (regardless of gender), in order of decreasing frequency are: PUJ obstruction (22%), posterior urethral valve (18%), ectopic ureterocoele (14%), Prune-belly syndrome (12%), and VUJ obstruction (8%).

*Ref: Radiology Review Manual, 6th Ed, p. 931.*